Appendix B

Registration licence – Entitlement BEE030364

Entitlement ID:

BEE030364

Printed on: 25 Aug 2014 11:40:54 am

COPY OF RECORD IN THE VICTORIAN WATER REGISTER

REGISTRATION LICENCE

under Section 51(1A) of the Water Act 1989

The information in this copy of record is as recorded at the time of printing. Current information should be obtained by a search of the register. The State of Victoria does not warrant the accuracy or completeness of this information and accepts no responsibility for any subsequent release, publication or reproduction of this information.

This licence does not remove the need to apply for any authorisation or permission necessary under any other Act of Parliament with respect to anything authorised by the registration licence.

Water used under this entitlement is not fit for any use that may involve human consumption, directly or indirectly, without first being properly treated.

The Authority does not guarantee, by the granting of the licence, that the licensee will obtain any specific quantity or quality of water. The Authority is not liable for any loss or damage suffered by the licensee as a result of the quantity of water being insufficient or the quality of the water being unsuitable for use by the licensee at any particular time or for any particular purpose.

This registration licence entitles its holders to take and use water as set out under the licence description, subject to the conditions that are specified.

Licence Holder(s)

BARRO GROUP PTY LTD of C/- IAN ALEXANDER
191 DRUMMOND STREET CARLTON VIC 3053

Licence Contact Details

BARRO GROUP PTY LTD
C/- IAN ALEXANDER
191 DRUMMOND STREET
CARLTON VIC 3053

Licence Description

Expiry date	Ongoing
Status	Active
Authority	Southern Rural Water
Name of waterway, aquifer or works	LITTLE RIVER-Moorabool
Water system type	Unregulated waterway, spring or run-off
River basin or groundwater unit	Moorabool
Licence volume	74.7 megalitres
Licence volume adjusted for temporary trade	74.7 megalitres
Method of taking	Harvesting using an off-waterway dam
Period during which water can be taken	01 Jul - 30 Jun inclusive
Use of water	Industrial or commercial use - as well as domestic and stock use

Licence Volume Details

Licence volume	74.7 megalitres
Licence volume adjusted for temporary trade	74.7 megalitres

Temporary volume transaction details

Approval date	*Volume traded (ML)*	*Expiry date*
Nil		

Extraction Point Details

Easting	*Northing*	*Zone MGA*	*Location description*
273707	5800443	Zone 55	DRYSDALE ROAD LITTLE RIVER
273504	5799386	Zone 55	DRYSDALE ROAD LITTLE RIVER
272643	5799791	Zone 55	DRYSDALE ROAD LITTLE RIVER
272700	5799580	Zone 55	DRYSDALE ROAD LITTLE RIVER

Land on which the Water is to be Used

Land description

Volume 9391 Folio 124
CA 13 Section 11 Parish of Wurdi-Youang

Volume 10275 Folio 234
Lot 2 of Plan PS344713R

Property address

250 DRYSDALE ROAD, LITTLE RIVER, VIC 3211
DRYSDALE ROAD, LITTLE RIVER, VIC 3211

This entitlement runs with the land and as such it may not be transferred to another parcel of land.

Related Instruments

Related entitlements	Nil
Related works licences	WLE036219
Other related entities	Nil

Application History

Reference	*Type*	*Status*	*Lodged date*	*Approved date*	*Recorded date*
BER021213	Modify	Approved	25 Aug 2014	25 Aug 2014	
BEI480387	Issue	Approved	29 Aug 2009	29 Aug 2009	

Conditions

This registration licence is subject to the following conditions:

Operation and maintenance

1 The licence holder must maintain all works and appliances used to take water under this licence in a safe and efficient working order including any dam if water is taken from a dam under this licence.

Preventing pollution

2 The licence holder must not pollute any water, or the environment, through the spillage of fuel or lubricant or any gaseous, liquid or solid matter used in connection with the works and appliances associated with this licence.

Take volume and location

3 The licence holder must not use any water in excess of the annual entitlement volume in any twelve month period from 1 July to 30 June.

END OF COPY OF RECORD

Works Licence ID:

WLE036219

Printed on: 25 Aug 2014 11:40:58 am

COPY OF RECORD IN THE VICTORIAN WATER REGISTER

LICENCE TO OPERATE WORKS

under Section 67 of the Water Act 1989

The information in this copy of record is as recorded at the time of printing. Current information should be obtained by a search of the register. The State of Victoria does not warrant the accuracy or completeness of this information and accepts no responsibility for any subsequent release, publication or reproduction of this information.

This licence does not remove the need to apply for any authorisation or permission necessary under any other Act of Parliament with respect to anything authorised by the works licence.

Water used under this licence is not fit for any use that may involve human consumption, directly or indirectly, without first being properly treated.

This licence is not to be interpreted as an endorsement of the design and/or construction of any works (including dams). The Authority does not accept any responsibility or liability for any suits or actions arising from injury, loss, damage or death to person or property which may arise from the maintenance, existence or use of the works.

Each person named as a licence holder is responsible for ensuring all the conditions of this licence are complied with.

This licence authorises its holders to operate the described works, subject to the conditions.

Licence Holder(s)

BARRO GROUP PTY LTD of C/- IAN ALEXANDER
191 DRUMMOND STREET CARLTON VIC 3053

Licence Contact Details

BARRO GROUP PTY LTD	C/- IAN ALEXANDER 191 DRUMMOND STREET CARLTON VIC 3053

Licence Details

Expiry date	Ongoing
Status	Active
Authority	Southern Rural Water
Name of waterway or aquifer	LITTLE RIVER-Moorabool
Water system	Moorabool

Summary of Licensed Works

The details in this section are a summary only. They are subject to the conditions specified in this licence.

Works ID	*Works type*	*Use of water*
WRK033599	Dam	Industrial or commercial
WRK036394	Dam	Industrial or commercial
WRK037757	Dam	Industrial or commercial
WRK038326	Dam	Industrial or commercial

Description of Licensed Works

WORKS ID WRK033599

Works type	Dam
Dam capacity	110.90 megalitres

Extraction Details

Service point/s	SP082091 UnMetered
Maximum annual volume	65.000 megalitres
Use of water	Industrial or commercial use - as well as domestic and stock use

Works location

Easting	*Northing*	*Zone MGA*
273707	5800443	Zone 55

Land description

Volume 10275 Folio 234
Lot 2 of Plan PS344713R

Property address

250 DRYSDALE ROAD, LITTLE RIVER, VIC 3211

Description of Licensed Works

WORKS ID WRK036394

Works type	Dam
Dam capacity	0.70 megalitres

Extraction Details

Service point/s	SP082092 UnMetered
Maximum annual volume	0.700 megalitres
Use of water	Industrial or commercial use - as well as domestic and stock use

Works location

Easting	*Northing*	*Zone MGA*
273504	5799386	Zone 55

Land description

Volume 10275 Folio 234
Lot 2 of Plan PS344713R

Property address

250 DRYSDALE ROAD, LITTLE RIVER, VIC 3211

Description of Licensed Works

WORKS ID WRK037757

Works type	Dam
Dam capacity	2.20 megalitres

Extraction Details

Service point/s	SP082093 UnMetered
Maximum annual volume	2.000 megalitres
Use of water	Industrial or commercial use - as well as domestic and stock use

Works location

Easting	*Northing*	*Zone MGA*
272643	5799791	Zone 55

Land description

Volume 9391 Folio 124
CA 13 Section 11 Parish of Wurdi-Youang

Property address

DRYSDALE ROAD, LITTLE RIVER, VIC 3211

Description of Licensed Works

WORKS ID WRK038326

Works type	Dam
Dam capacity	7.00 megalitres
Dam wall height	2.000 metres

Extraction Details

Service point/s	SP082094 UnMetered
Maximum annual volume	7.000 megalitres
Use of water	Industrial or commercial use - as well as domestic and stock use

Works location

Easting	*Northing*	*Zone MGA*
272700	5799580	Zone 55

Land description

Volume 9391 Folio 124
CA 13 Section 11 Parish of Wurdi-Youang

Property address

DRYSDALE ROAD, LITTLE RIVER, VIC 3211

Related Instruments

Related entitlements	BEE030364
Related water-use entities	Nil

Application History

Reference	*Type*	*Status*	*Lodged date*	*Approved date*	*Recorded date*
WLV038617	Modify	Approved	25 Aug 2014	25 Aug 2014	
WLV037396	Modify	Approved	10 Jul 2012	11 Jul 2012	
WLI554628	Issue	Approved	29 Aug 2009	29 Aug 2009	

Conditions

Licence WLE036219 is subject to the following conditions:

Preventing pollution

1 Water must not be taken through the works if the Authority reasonably believes fuel, or lubricant, or any other matter used in connection with works and appliances associated with this licence, is at risk of contaminating a waterway, or aquifer, or the riparian or riverine environment.

2 The licence holder must construct and maintain bund walls around any hydrocarbon-fuel-driven engine, motor, fuel storage, or chemical storage used in connection with this licence, in accordance with the timeframe, specifications, guidelines and standards prescribed by the Authority.

3 Water must not be taken through the works associated with the dam if the Authority reasonably believes fuel, or lubricant, or any other matter used in connection with works and appliances associated with this licence, is at risk of being spilled into a waterway, or aquifer, or into the riparian or riverine environment.

Method of taking

4 The licence holder must at all times provide the Authority with safe access to inspect all works and appliances used to take water under this licence.

Rosters and restrictions

5 When directed by the Authority, water must be taken in accordance with the rosters and restrictions determined by the Authority, and advised to the licence holder.

Metering of water taken and used

6 The licence holder must, if required by the Authority, keep an accurate record of the quantity of water taken under this licence and allow the Authority to inspect this record at all reasonable times, and provide a copy of the record when requested.

7 The Authority may, if it deems necessary, make an estimate of the total volume of water taken under this licence.

Dam safety and surveillance

8 The licence holder must, in the event of a potential or actual dam failure, immediately provide warnings to potentially impacted downstream property owners and communities, SES, Victoria Police, Council and the Authority and must take steps to make the dam safe.

9 If a deficiency is found in the structure of the dam that is not minor in nature, the licence holder must immediately advise the Authority of the nature of the deficiency and engage a suitably qualified engineer to propose a program to rectify it, and complete the works having appropriate regard to the ANCOLD guidelines.

10 The licence holder must carry out, to the satisfaction of the Authority, any remedial works identified by a suitably qualified engineer.

Operation and maintenance

11 Water may only be taken through the works at the specified location.

12 The licence holder must keep all works, appliances and dams associated with this licence, including outlet pipes and valves, in a safe and operable condition, and free from obstacles and vegetation that might hinder access to works.

13 Water may only be taken through the works if the works are sited, constructed, operated and maintained to the satisfaction of the Authority.

14 Works must not be altered, removed or decommissioned without a licence that authorises alteration, removal or decommissioning.

Protecting biodiversity

15 Water must not be taken through the works if the Authority reasonably believes that the taking of water, through the works and appliances associated with this licence, is at risk of causing

damage to the environment.

16 The licence holder must, if required by the Authority, remedy any damage to the environment that in the opinion of the Authority is a result of the installation, operation or maintenance of the works.

Fees and charges

17 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

END OF COPY OF RECORD

Appendix C

Groundwater take and use - Entitlement BEE072352

Entitlement ID:

BEE072352

Printed on: 10 Nov 2021 1:15:22 pm

COPY OF RECORD IN THE VICTORIAN WATER REGISTER

TAKE AND USE LICENCE

under Section 51 of the Water Act 1989

The information in this copy of record is as recorded at the time of printing. Current information should be obtained by a search of the register. The State of Victoria does not warrant the accuracy or completeness of this information and accepts no responsibility for any subsequent release, publication or reproduction of this information.

This licence does not remove the need to apply for any authorisation or permission necessary under any other Act of Parliament with respect to anything authorised by the take and use licence.

Water used under this entitlement is not fit for any use that may involve human consumption, directly or indirectly, without first being properly treated.

The Authority does not guarantee, by the granting of the licence, that the licensee will obtain any specific quantity or quality of water. The Authority is not liable for any loss or damage suffered by the licensee as a result of the quantity of water being insufficient or the quality of the water being unsuitable for use by the licensee at any particular time or for any particular purpose.

This take and use licence entitles its holders to take and use water as set out under the licence description, subject to the conditions that are specified.

Licence Holder(s)

BARRO GROUP PTY LTD of PO BOX 663 CARLTON SOUTH VIC 3053

Licence Contact Details

BARRO GROUP PTY LTD	PO BOX 663 CARLTON SOUTH VIC 3053 AU

Licence Description

Expiry date	30 Jun 2029
Status	Active
Authority	Southern Rural Water
Name of waterway, aquifer or works	UNC-Unincorporated
Water system type	Groundwater (West Port Phillip Bay catchment)
River basin or groundwater unit	Unincorporated (GMU)
Licence volume	44.0 megalitres
Licence volume adjusted for temporary trade	44.0 megalitres
Method of taking	Direct extraction from groundwater
Period during which water can be taken	01 Jul - 30 Jun inclusive
Use of water	Industrial or commercial use - as well as domestic and stock use
Trading Zone	Unincorporated

Licence Volume Details

Licence volume	44.0 megalitres
Licence volume adjusted for temporary trade	44.0 megalitres

Temporary volume transaction details

Approval date	*Volume traded (ML)*	*Expiry date*
Nil		

Extraction Point Details

Easting	*Northing*	*Zone MGA*	*Location description*
273940	5800375	Zone 55	250 DRYSDALE ROAD LITTLE RIVER

Land on which the Water is to be Used

Land description

Volume 9391 Folio 124
CA 13 Section 11 Parish of Wurdi-Youang

Volume 10275 Folio 234
Lot 2 of Plan PS344713R

Property address

250 DRYSDALE ROAD, LITTLE RIVER, VIC 3211

Related Instruments

Related entitlements	Nil
Related works licences	WLE060541
Other related entities	Nil

Application History

Reference	*Type*	*Status*	*Lodged date*	*Approved date*	*Recorded date*
PTA031691	Address amendment	Recorded			01 May 2015
BER049825	Modify	Approved	10 Nov 2021	10 Nov 2021	
BEI036677	Issue	Approved	23 Sep 2014	23 Sep 2014	

Conditions

This take and use licence is subject to the following conditions:

Method of taking

1 Water may only be taken under this licence if it is taken by the method specified in this licence.

2 The licence holder must at all times provide the Authority with safe access to inspect all works and appliances used to take water under this licence.

Take location

3 Water may only be taken under this licence if it is taken at the location specified in the licence under "extraction point details".

Take volume and rate

4 The volume of water taken under this licence in any twelve-month period from 1 July to 30 June must not exceed the licence volume, less any volume that has been temporarily transferred to another person or location.

5 The maximum volume that may be taken under this licence in any one day is 1.00 megalitres per day.

Temporary transfers to the licence holder

6 If there has been a temporary transfer of another licence to take water at the location, and use water on the land, specified in this licence:

a) the extra volume of water taken must not exceed the volume transferred, and

b) all the conditions of this licence apply to the taking and using of water consequential to the transfer.

Water allocations

7 The Authority may determine water allocations at 1 July or during the course of the subsequent twelve-month period that are less than 100% of the licence volume, in which case the licence volume is correspondingly reduced for that twelve-month period.

Take period

8 Unless otherwise directed by the Authority, water may be taken at any time between 1 July and 30 June.

Rosters and restrictions

9 When directed by the Authority, water must be taken in accordance with the rosters and restrictions determined by the Authority, and advised to the licence holder.

Metering of water taken and used

10 Water may only be taken under this licence if it is taken through a meter approved by the Authority.

11 Meters must be installed, in accordance with the specifications set by the Authority, at the licence holder's expense.

12 Meters used for the purpose of this licence are deemed to be the property of the Authority.

13 The licence holder must at all times provide the Authority with safe access to meters for the purpose of reading, calibration or maintenance.

14 The licence holder must notify the Authority within one business day if the meter ceases to function or operate properly.

15 The licence holder must, if required by the Authority, keep an accurate record of the quantity of water taken under this licence and allow the Authority to inspect this record at all reasonable times, and provide a copy of the record when requested.

16 The licence holder must not, without the consent of the Authority, interfere with, disconnect or remove any meter used for the purposes of the licence.

17 The Authority may, if it deems necessary, make an estimate of the total volume of water taken

under this licence.

Use of water

18 Water taken under this licence may only be used on the land, and for the purposes, specified in the licence.

19 The licence holder must at all times provide the Authority with safe access to inspect the land on which water is licensed to be used.

Managing drainage disposal

20 Where water use results in drainage from the land specified in the licence, that drainage water must be disposed in ways that meet with the standards, terms and conditions adopted from time to time by the Authority.

Fees and charges

21 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

END OF COPY OF RECORD

Works Licence ID:

WLE060541

Printed on: 10 Nov 2021 1:17:22 pm

COPY OF RECORD IN THE VICTORIAN WATER REGISTER

LICENCE TO OPERATE WORKS

under Section 67 of the Water Act 1989

The information in this copy of record is as recorded at the time of printing. Current information should be obtained by a search of the register. The State of Victoria does not warrant the accuracy or completeness of this information and accepts no responsibility for any subsequent release, publication or reproduction of this information.

This licence does not remove the need to apply for any authorisation or permission necessary under any other Act of Parliament with respect to anything authorised by the works licence.

Water used under this licence is not fit for any use that may involve human consumption, directly or indirectly, without first being properly treated.

This licence is not to be interpreted as an endorsement of the design and/or construction of any works (including dams). The Authority does not accept any responsibility or liability for any suits or actions arising from injury, loss, damage or death to person or property which may arise from the maintenance, existence or use of the works.

Each person named as a licence holder is responsible for ensuring all the conditions of this licence are complied with.

This licence authorises its holders to operate the described works, subject to the conditions.

Licence Holder(s)

BARRO GROUP PTY LTD of PO BOX 663 CARLTON SOUTH VIC 3053

Licence Contact Details

BARRO GROUP PTY LTD	PO BOX 663 CARLTON SOUTH VIC 3053 AU

Licence Details

Expiry date	30 Jun 2029
Status	Active
Authority	Southern Rural Water
Name of waterway or aquifer	UNC-Unincorporated
Water system	Unincorporated (GMU)

Summary of Licensed Works

The details in this section are a summary only. They are subject to the conditions specified in this licence.

Works ID	*Works type*	*Use of water*
WRK081946	Bore	Industrial or commercial

Description of Licensed Works

WORKS ID WRK081946

Works type	Bore
Works subtype	Well / shaft
Constructed depth	100.000 metres

Extraction Details

Service point/s	SP122776 WRK081946
Maximum extraction rate	1.000 megalitres per day (The physical capacity of the works)
Maximum daily volume	1.000 megalitres (The volume authorised to be extracted via the works)
Maximum annual volume	44.000 megalitres
Use of water	Industrial or commercial use - as well as domestic and stock use

Works location

Easting	*Northing*	*Zone MGA*
273940.0000	5800375.0000	Zone 55

Land description

Volume 10275 Folio 234
Lot 2 of Plan PS344713R

Property address

250 DRYSDALE ROAD, LITTLE RIVER, VIC 3211

Related Instruments

Related entitlements	BEE072352
Related water-use entities	Nil

Application History

Reference	*Type*	*Status*	*Lodged date*	*Approved date*	*Recorded date*
PTA031691	Address amendment	Recorded			01 May 2015
WLV907280	Modify	Approved	10 Nov 2021	10 Nov 2021	
WLI018213	Issue	Approved	23 Sep 2014	23 Sep 2014	

Conditions

Licence WLE060541 is subject to the following conditions:

Preventing pollution

1 Water must not be taken through the works if the Authority reasonably believes fuel, or lubricant, or any other matter used in connection with works and appliances associated with this licence, is at risk of contaminating a waterway, or aquifer, or the riparian or riverine environment.

2 The licence holder must construct and maintain bund walls around any hydrocarbon-fuel-driven engine, motor, fuel storage, or chemical storage used in connection with this licence, in accordance with the timeframe, specifications, guidelines and standards prescribed by the Authority.

Rosters and restrictions

3 When directed by the Authority, water must be taken in accordance with the rosters and restrictions determined by the Authority, and advised to the licence holder.

Metering of water taken and used

4 Water may only be taken under this licence if it is taken through a meter approved by the Authority.

5 Meters must be installed, in accordance with the specifications set by the Authority, at the licence holder's expense.

6 Meters used for the purpose of this licence are deemed to be the property of the Authority.

7 The licence holder must at all times provide the Authority with safe access to meters for the purpose of reading, calibration or maintenance.

8 The licence holder must notify the Authority within one business day if the meter ceases to function or operate properly.

9 The licence holder must, if required by the Authority, keep an accurate record of the quantity of water taken under this licence and allow the Authority to inspect this record at all reasonable times, and provide a copy of the record when requested.

10 The licence holder must not, without the consent of the Authority, interfere with, disconnect or remove any meter used for the purposes of the licence.

11 The Authority may, if it deems necessary, make an estimate of the total volume of water taken under this licence.

Protecting other water users

12 The licence holder must, if required by the Authority, monitor and record water levels in the bore(s) before and after pumping; the licence holder must also provide this information in writing as directed by the Authority.

13 The licence holder must, at the licence-holder’s expense, if required by the Authority, conduct a pumping test and obtain a hydrogeological report, to the Authority's specification, on the potential for bore operation to interfere with any bore, aquifer, groundwater dependent ecosystem or waterway.

14 The licence holder must, if required by the Authority, provide the Authority with the results of water quality tests on samples of water pumped from the bore.

15 The licence holder must provide the Authority with safe access to the licensed bore and works for the purposes of obtaining water level measurements, water samples and any other information or data pertaining to the operation of the bore, the works and the aquifer.

16 The licence holder must, if required by the Authority, cease taking water entirely, or cease taking water for a given period, or reduce the quantity of water taken during any period if, the Authority reasonably believes, or in accordance with the assessment in a Groundwater Management Plan, the use or disposal of water under this licence may injure or adversely affect any other person or an aquifer or the environment.

17 The licence holder must, if required by the Authority, enter into a formal agreement to supply

water to any party affected by interference from bore operation.

18 The bore(s) must not be altered or decommissioned without a works licence that authorises alteration, or decommissioning.

Operation and maintenance

19 Water may only be taken through the works at the specified location.

20 The licence holder must keep all works, appliances and dams associated with this licence, including outlet pipes and valves, in a safe and operable condition, and free from obstacles and vegetation that might hinder access to works.

21 Water may only be taken through the works if the works are sited, constructed, operated and maintained to the satisfaction of the Authority.

22 The licence holder must at all times provide the Authority with safe access to inspect all works and appliances used to take water under this licence.

Protecting biodiversity

23 Water must not be taken through the works if the Authority reasonably believes that the taking of water, through the works and appliances associated with this licence, is at risk of causing damage to the environment.

24 The licence holder must, if required by the Authority, remedy any damage to the environment that in the opinion of the Authority is a result of the installation, operation or maintenance of the works.

Fees and charges

25 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

END OF COPY OF RECORD

Appendix D

Melbourne Water letters to BCA Consulting

7 October 2021

Liesl Cristanelli
BCA Consulting
29/41 Norcal Road
Nunawading VIC 3131

Dear Liesl,

Proposal: Work Plan Variation
Site location: 250 DRYSDALE ROAD LITTLE RIVER 3211

Melbourne Water reference: MWA-1194794
Other/Your reference: WA453
Date referred: 04/12/2020

Thank you for your application for pre-development advice, and design plans, for the above referenced property.

Flooding Information

Information available at Melbourne Water indicates that this property is not subject to flooding from Melbourne Water's drainage system, based on a flood level that has a probability of occurrence of 1% in any one year. It is recommended to contact the relevant Local Council regarding the impact of flooding associated with the local drainage system.

Assessment of your proposal

Melbourne Water assesses development applications in accordance with the four (4) key objectives (detailed below) outlined in the Guidelines for Development in Flood Affected Areas (DELWP, 2019). Under these Guidelines, development in or adjacent to a flood affected area may only be acceptable where the new development protects human life and health from flood hazard, minimises flood damage potential, maintains free passage and temporary storage of flood waters and protects and enhances the environmental features of waterways and floodplains.

Waterway and Floodplain Protection

There are two catchment areas containing three tributaries on this site, one in the north west of the site, and two to the south east of the site. (See Figure 1) The site lies in the catchment of the Little River Lower and Upper sub-catchments.

The creation of 'exclusion zones' is required to protect the waterways and drainage lines. The exclusion zone must be of adequate width to the satisfaction of Melbourne Water to ensure that the extraction activities (extent and depth of works) do not affect the local hydrology, flood management , geomorphology or ecological values of the

Melbourne Water ABN 81 945 386 953
990 La Trobe Street Docklands VIC 3008
PO Box 4342 Melbourne VIC 3001 Australia
T 131 722 F +61 3 9679 7099
melbournewater.com.au

waterway and further consideration must be given to the effects of both during the quarrying operation and once quarrying is finished and the site is rehabilitated.

The entire catchment (waterway 2 and 3) is draining to the south east. (see Figure 2).

These waterways must be excluded from all quarrying operations, including all access roads, bunds buildings, etc. The extent of any operations must not extend past the edge contour of the plateau on the northern side of the plateau.

Melbourne Water requires parts of the catchment that still naturally drain and provide flows outside the current pit are also excluded from all quarry operations. (see Figure 3) Melbourne Water requires the protection and rehabilitation of these exclusion zones and must include fencing, weed control and re-vegetation using indigenous trees, shrubs and groundcover species of local provenance. The exclusion zone must be fenced off prior to the commencement of works to minimise damage. An environmental works plan for the excluded zones containing the waterways & drainage lines must be prepared and submitted to Melbourne Water for further approval prior to implementation and construction.

The work authority plan must be amended to include the following:

a) A clear aerial map detailing:

- the extent of expansion areas and depths (this should be clearly and accurately overlayed over an aerial with contour lines)
- Contour lines (as accurate as possible – preferably 1-5m)
- All waterways and tributaries within the site and within 200m of the boundary of the site.
- Proposed exclusion zones relative to the contour lines

b) Supporting documentation and information that demonstrates that the local hydrology, geomorphology or ecological values of the local waterways have been considered and can be appropriately managed and protected through the expansion of the mine.

c) A site drainage and environmental management/works plan showing:

- Details of sediment controls within the development site to avoid sediment and sediment laden water leaving the site and entering the nearby catchments and waterways;
- Details of any overflow channels from the dam and how these are managed/what controls are in place to prevent sediment loss or any damage to the waterway downstream. *Should the dam have overflows into the downstream waterway, a sediment pond and grassed swale is strongly recommended for treatment prior to discharge into the waterway;
- Treatment of overland flow on the site and any overland flow leaving the site
- Bund details and location
- Any proposed connections to the waterways/drainage lines and treatment areas for sediment control.* Please note - The concentration of stormwater flows to points exiting the property other than the natural locations may contravene the Water Act (Part 2 Division 2 – Liabilities);
- All proposed and approved vegetation management across the site including fencing, weed control, revegetation and exclusion zones

d) A plan of how the works are to be 'staged' over the life of the quarry. It is recommended that the quarrying works be staged to minimise and mitigate any

unforeseen impacts.

e) A rehabilitation plan for the end of the quarry life. This must include a wetland or series of wetlands (using Melbourne Water guidelines) for the future treatment of water leaving the site.

Re-alignment or diversion of Waterways

If the waterways are proposed to be diverted or realigned within the site these diversions must be included and outlined within the Work Authority Plan and submitted to Melbourne Water for approval prior to implementation and construction. It is strongly recommended that realignment proposals be discussed with Melbourne Water early in the work authority process as further approval and assessment of works is required for this.

Waterway Connections

All connections to waterways to be constructed according to Melbourne Water Guidelines

https://www.melbournewater.com.au/planning-and-building/apply-to-buildor-develop/stormwater-connection and submitted to Melbourne Water for approval prior to implementation and construction.

Waterway Crossings

All waterway crossings should be constructed according to Melbourne Water Guidelines https://www.melbournewater.com.au/planning-and-building/apply-to-build-ordevelop/construct-bridge-crossing-or-culvert and submitted to Melbourne Water for approval prior to implementation and construction.

Advice

This advice is valid for a period of three months from the date of this letter.

This advice is provided as information only and Melbourne Water anticipates receipt of any formal application for planning pursuant to Section 55 of the Planning and Environmental Act 1987.

The above information is only preliminary and forms no contractual agreement between your company and Melbourne Water. Melbourne Water reserves the right to alter any or all of this information at any time.
If you have any enquiries please contact me on 131 722 or email devconnect@melbournewater.com.au quoting Melbourne Waters reference number in the subject line.

To find out more information in regards to building in flood prone areas please visit our website for more information.

For general development enquiries contact our Customer Service Centre on 131722.

Regards,

Louise Ripper
Development Planning Services

Figure 1: Site and Layout of waterways 1, 2 and 3

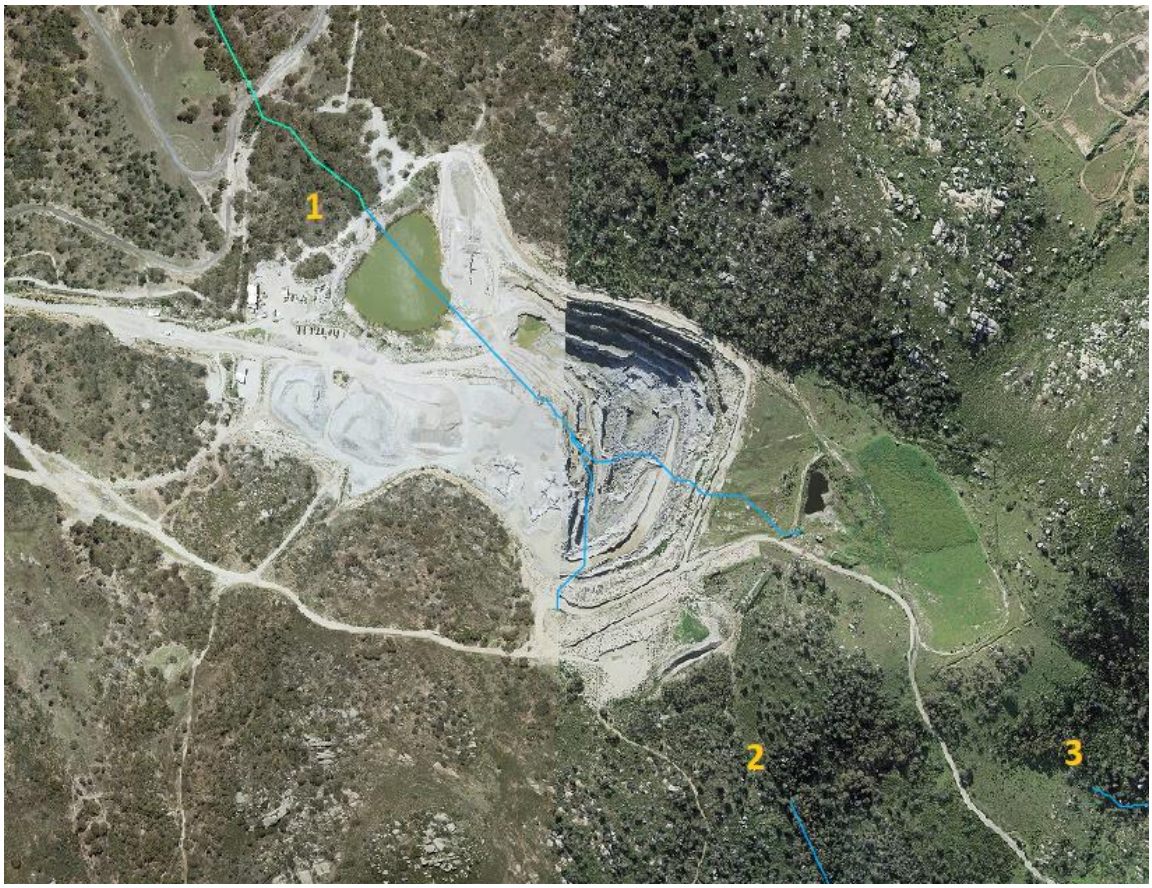
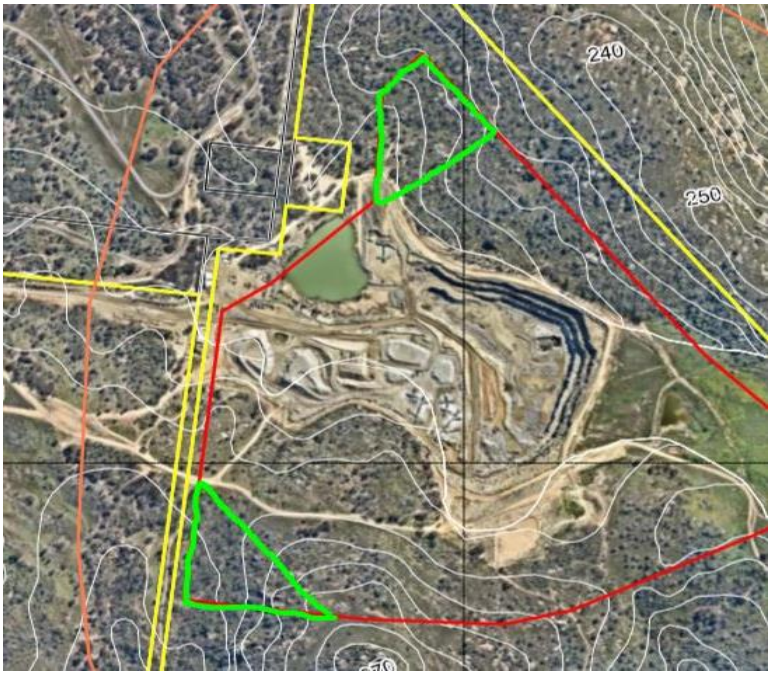


Figure 2: Melbourne Water requires an exclusion zone Operations are only to occur to the north

The entire catchment (waterway 2 and 3) is draining to the south east. These waterway must be excluded from all quarrying operations (including all access roads, bunds buildings, etc.). The extent of any operations must not extend past the edge contour of the plateau on the northern side of the plateau as roughly depicted in the image below

Figure 3 Exclusion zone to enable continued natural flows to the Little River Catchment

Melbourne Water requires parts of the catchment that still naturally drain and provide flows outside the current pit to be excluded from all quarry operations. These areas have been highlighted in green in the image below.



18 October 2022

Liesl Cristanelli
BCA Consulting
29/41 Norcal Road
Nunawading VIC 3131

Dear Liesl,

Proposal: Pre-development advice - Work Plan Variation
Site location: 250 DRYSDALE ROAD LITTLE RIVER 3211

Melbourne Water reference: MWA-1194794
Other/Your reference: WA453
Date referred: 04/12/2020

Thank you for forwarding further information to Melbourne Water on 24 August 2022 for assessment and advice.

As noted by Melbourne Water in response of 7 October 2021, our concerns for the proposed quarry extension works are mainly about drainage/ conveying of flows through the property and protection of the waterways running in proximity to the proposed works area. We had noted that there are two catchment areas containing three tributaries on this site, one in the north west of the site, and two to the south east of the site. (See Figure 1). The site lies in the catchment of the Little River Lower and Upper sub-catchments.

Figure 1

Melbourne Water required creation of two 'exclusion zones' to north and south-west of the works location to protect the waterways and drainage lines to ensure that the extraction activities (extent and depth of works) do not affect the local hydrology, flood management, geomorphology or ecological values of the waterway with further consideration given to the effects of both during the quarrying operation and once quarrying is finished and the site is rehabilitated. (See Figure 2)

Melbourne Water ABN 81 945 386 953
990 La Trobe Street Docklands VIC 3008
PO Box 4342 Melbourne VIC 3001 Australia
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melbournewater.com.au

Figure 2

Melbourne Water's updated requirements for the Work Plan are as following:

1. The extent of all operations including all access roads, bunds buildings, etc should not extend past the edge contour of the plateau on the northern side - The submitted Draft Water Management Plan indicates that the area to the north of the existing quarry is now excluded as per this requirement. Regarding the required south-west exclusion area, the Draft Water Management Plan has indicated that this area provides drainage to a licensed water catchment dam (Dam 3) on the southern boundary of Work Authority (WA453), which is registered with Southern Rural Water as WRK036394. (Current Licence agreement with Southern Rural Water has been submitted)

2. Aerial map (showing extent of expansion, contour lines and waterways and tributaries within 200m of the site) (Draft Water Management Plan) as submitted is acceptable to Melbourne Water and if amended in future must be forwarded to us for assessment and approval.

3. Sediment controls must be in place within the development site to avoid any sediment and sediment laden water leaving the site and entering the nearby catchments and waterways. (Dam overflows have been shown to be naturally draining into the downstream waterway – a sediment pond and grassed swale is strongly recommended for treatment prior to discharge into the waterway)

4. All proposed and approved vegetation management across the site including fencing, weed control, revegetation and exclusion zones should be indicated.

5. A plan should be produced as to how the works are to be 'staged' over the life of the quarry. It is recommended that the quarrying works be staged to minimise and mitigate any unforeseen impacts.

6. A rehabilitation plan should be produced for the end of the quarry life. This must include a wetland or series of wetlands (using Melbourne Water guidelines) for the future treatment of water leaving the site. (Note:

7. Re-alignment or diversion of Waterways – This requirement is to be considered IF the waterways are proposed to be diverted or realigned within the Work Authority Plan. These diversions if relevant must be included and outlined within the Work Authority Plan and submitted to Melbourne Water for approval prior to implementation and construction. It is strongly recommended that realignment proposals be

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discussed with Melbourne Water at the current early stages of the work authority process as further approval and assessment of works is required for this.

8. Waterway Connections - All connections to waterways to be constructed according to Melbourne Water Guidelines https://www.melbournewater.com.au/planning-and-building/apply-to-buildordevelop/stormwater-connection and submitted to Melbourne Water for approval prior to implementation and construction.

9. Waterway Crossings - All waterway crossings should be constructed according to Melbourne Water Guidelines https://www.melbournewater.com.au/planning-and-building/apply-to-buildordevelop/construct-bridge-crossing-or-culvert and submitted to Melbourne Water for approval prior to implementation and construction.

Advice

This advice is valid for a period of three months from the date of this letter.

The above information is only preliminary and forms no contractual agreement between your company and Melbourne Water. Melbourne Water reserves the right to alter any or all of this information at any time.

If you have any enquiries please contact me on 131 722 or email devconnect@melbournewater.com.au quoting Melbourne Waters reference number in the subject line.

Regards,

Indi Prathapasinghe
Development Planning Services

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Appendix E

Bore logs – Bore 75047, 75048 and 75053 (WRK039056)

Appendix E
Bore logs – Bore 75047, 75048 and 75053 (WRK039056)

Table E.1: Bore logs – Bore 75047, 75048 and 75053 (WRK039056)

From (m)	To (m)	Description
Bore No. 75047		
3.1	9.2	Copper coloured sandstone
9.2	48.76	Yellow sandstone with impregnated granite sand
48.76	50.58	Fine gravels and coarse granite sands (dry)
50.58	56.08	Yellow sandstone with granite sand
56.08	60.39	Cream clay and granite sand
60.39	62.76	Fine gravels water bearing with narrow sandstone band from 62.5 to 62.8 m
62.76	66.56	Fine gravels water bearing, white clay with embedded granite
Bore No. 75048		
0.00	1.52	Hard red and yellow streaked clay with fine surface sand from surface to 0.45 m
1.52	3.61	Soft fine yellow and cream granulated clay
3.61	6.1	Brown loam
6.1	9.1	granite sand in cream clay
9.1	45.72	sandstone with embedded granite sand
45.72	48.77	coarse granite sand and small gravels water bearing
Bore No. 75053 Drillers log		
0	0.3	Topsoil
0.3	3	Clay
3	10	Sandy clay
10	20	Clayey sand
20	40	coarse brown sand; bands ironstone
40	47	Fine sands
47	59	Decomposed granites
59	68	Coarse sands
68	71	Brown sands
71	83	Sands; bands clay & coal

Bore No. 75053 Geologist log (summary)					
0	1	Topsoil	39	40	Clay
1	2	Clayey silt	40	43	Clayey gravel
2	5	Silty clay	43	44	Sandy gravel
5	6	Silty sand	44	47	Gravel, very coarse
6	15	Sand, very fine	47	57	Clayey gravel
15	18	Sand, fine	57	59	Gravel, very coarse
18	23	Sand, fine to medium	59	61	Gravel, conglomerate, clayey
23	24	Sand, medium coarse	61	68	Sandy gravel
24	32	Sandy clay, with clay -26m to 27m	68	71	Sand, coarse
32	33	Sand	71	74	Gravel, medium
33	34	Clayey gravel	74	82	Clayey gravel
34	35	Clay	82	85	Sandy gravel
35	39	Gravelly clay			

Appendix F

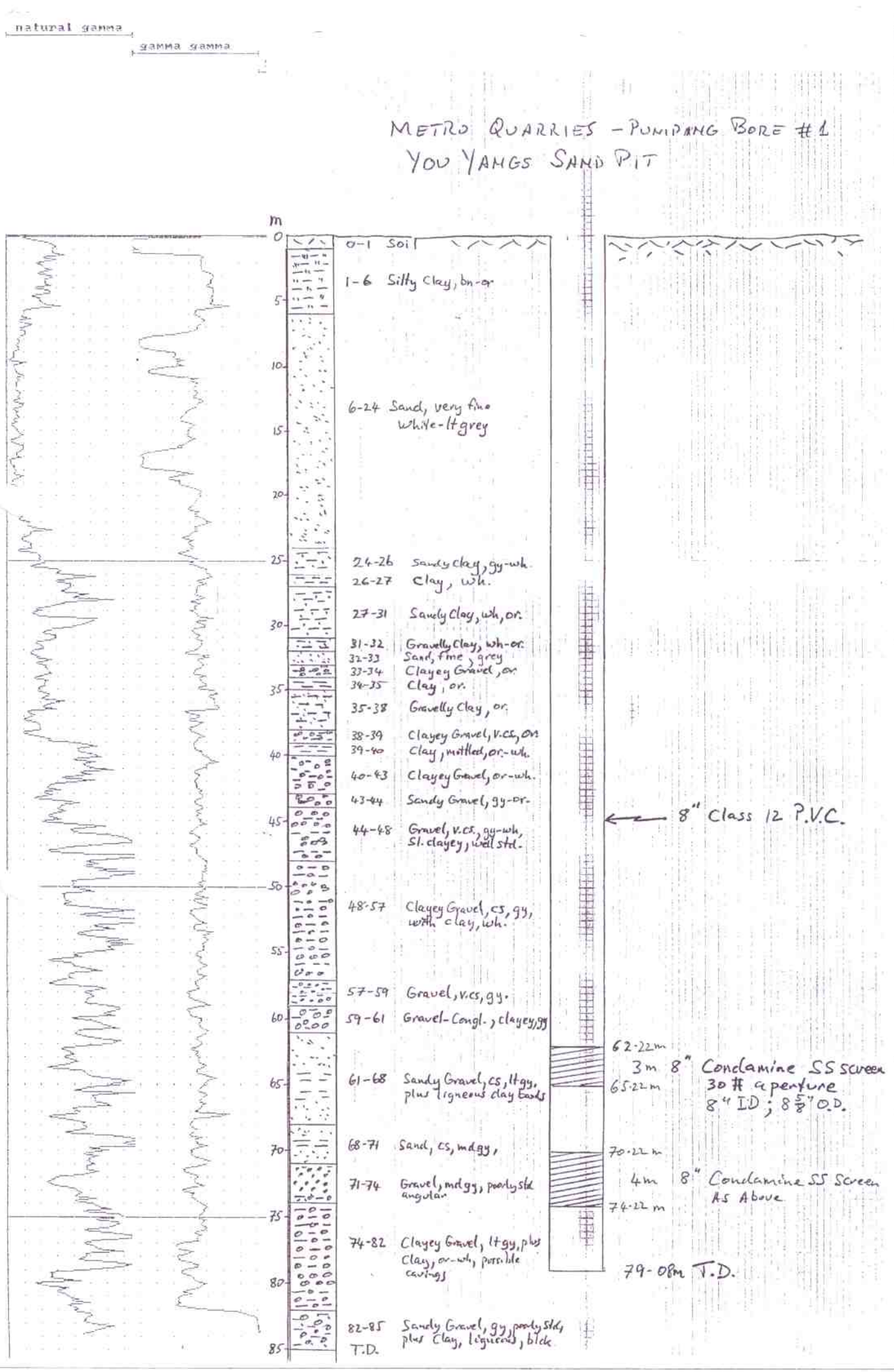
Bore log - Groundwater Bore PB#1 (75053/WRK039056)

METRO QUARRIES - GROUNDWATER BORE - PB#1
Sample Descriptions

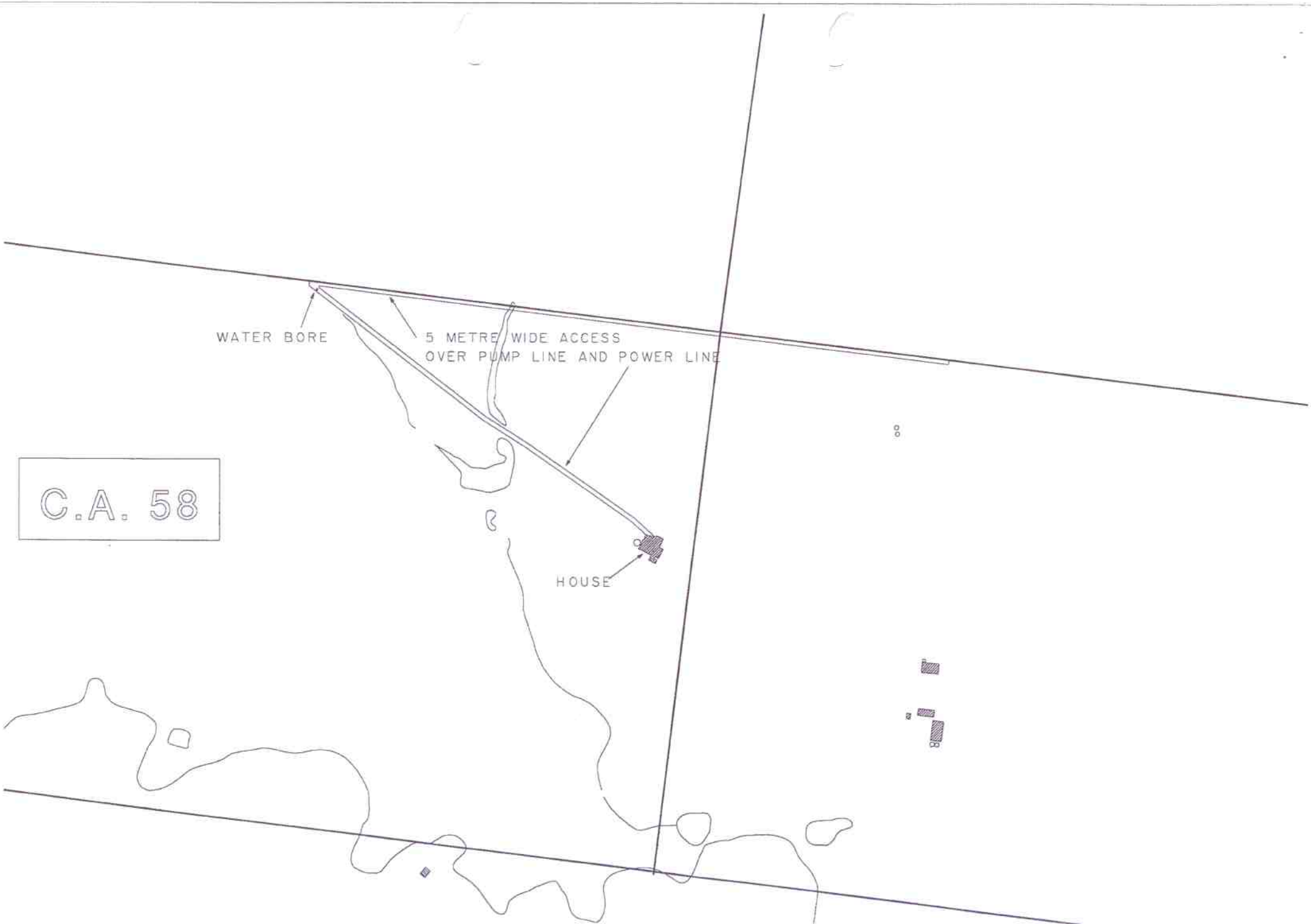
m	
0 - 1	Soil, gravely clay, orange-yellow
1 - 2	Clayey Silt, yellow-orange, micaceous
2 - 3	Silty Clay, brown-orange
3 - 4	Silty Clay, brown-orange
4 - 5	Silty Clay, brown-orange
5 - 6	Silty Sand, fine, yellow-light grey
6 - 7	Sand, very fine, white-light grey
7 - 8	Sand, very fine, white-light grey
8 - 9	Sand, very fine, white-light grey
9 - 10	Sand, very fine, white-light grey
10 - 11	Sand, very fine, white-light grey
11 - 12	Sand, very fine, pink
12 - 13	Sand, very fine, pink
13 - 14	Sand, very fine, pink
14 - 15	Sand, very fine, pink
15 - 16	Sand, fine, grey-white
16 - 17	Sand, fine, grey-white
17 - 18	Sand, fine, grey-white
18 - 19	Sand, fine, medium grey
19 - 20	Sand, fine, medium grey
20 - 21	Sand, fine, medium grey
21 = 22	Sand, fine, medium grey
22 - 23	Sand, fine, medium grey
23 - 24	Sand, medium-coarse, grey
24 - 25	Sandy Clay, grey-white
25 - 26	Sandy Clay, grey-white
26 - 27	Clay, white
27 - 28	Sandy Clay, white
28 - 29	Sandy Clay, white
29 - 30	Sandy Clay, white-orange
30 - 31	Sandy Clay, white-orange
31 - 32	Gravely Clay, white-orange
32 - 33	Sand, fine, grey
33 - 34	Clayey Gravel, orange
34 - 35	Clay, orange
35 - 36	Gravely Clay, orange
36 - 37	Gravely Clay, orange
37 - 38	Gravely Clay, orange
38 - 39	Clayey Gravel, very coarse, orange
39 - 40	Clay, mottled orange and white
40 - 41	Clayey Gravel, mottled orange and white
41 - 42	Clayey Gravel, mottled orange and white
42 - 43	Clayey Gravel, mottled orange and white
43 - 44	Sandy Gravel, grey-orange
44 - 45	Gravel, very coarse, grey-white, slightly clayey, well sorted
45 - 46	Gravel, very coarse, grey-white, slightly clayey, well sorted
46 - 47	Gravel, very coarse, grey-white, slightly clayey, well sorted

47 - 48	Gravel, very coarse, grey-white, slightly clayey, well sorted
48 - 49	Clayey Gravel, very coarse (2-3mm), angular clear quartz, well sorted
49 - 50	Clayey Gravel, coarse
50 - 51	Clayey Gravel, coarse
51 - 52	Clayey Gravel, coarse, grey, white clay
52 - 53	Clayey Gravel, coarse, grey, white clay
53 - 54	Clayey Gravel, coarse, grey, white clay
54 - 55	Clayey Gravel, very coarse, grey, white clay
55 - 56	Clayey Gravel, very coarse, grey, white clay
56 - 57	Clayey Gravel, very coarse, grey, white clay
57 - 58	Gravel, very coarse, grey, well sorted, 5 percent clay
58 - 59	Gravel, very coarse, grey, well sorted, 5 percent clay
59 - 60	Gravel-conglomerate-clayey, quartz (4-5mm), subrounded, grey
60 - 61	Gravel-conglomerate-clayey, quartz (4-5mm), subrounded, grey
61 - 62	Sandy Gravel, coarse, well sorted, dark grey, Note: probable formation change
62 - 63	Sandy Gravel, coarse, well sorted, dark grey
63 - 64	Sandy Gravel, very coarse, well sorted, angular, dark grey, plus ligneous clay, dark grey-black
64 - 65	Sandy gravel, coarse, (1-2mm), light grey, well sorted, porous
65 - 66	Sandy Gravel, coarse, (2-3mm), slightly clayey, medium grey
66 - 67	Sandy Gravel, coarse, (2-3mm), slightly clayey, medium grey plus ligneous clay, dark grey-black
67 - 68	Sandy Gravel, coarse, (2-3mm), slightly clayey, medium grey plus ligneous clay, dark grey-black
68 - 69	Sand, coarse (1-2mm) grading to gravel, medium grey
69 - 70	Sand, coarse (1-2mm) grading to gravel, medium grey, well sorted, angular, subrounded, porous
70 - 71	Sand, coarse (1-2mm) grading to gravel, medium grey, well sorted, angular, subrounded, porous
71 - 72	Gravel, medium grey, well sorted, angular, subrounded, porous
72 - 73	Gravel, medium grey, poorly sorted, angular, subrounded, porous
73 - 74	Gravel, medium grey, poorly sorted, angular, subrounded, porous
74 - 75	Clayey Gravel. light grey plus Clay, orange-white, limonitic Note: probable cavings
75 - 76	Clayey Gravel. light grey plus Clay, orange-white, limonitic Note: probable cavings
76 - 77	Clayey Gravel. light grey plus Clay, orange-white, limonitic Note: probable cavings
77 - 78	Clayey Gravel. light grey plus Clay, orange-white, limonitic Note: probable cavings

78 - 79	Clayey Gravel, light grey plus Clay, orange-white, limonitic and Sandy Gravel, very unconsolidated Note: includes probable cavings
79 - 80	Clayey Gravel, light grey plus Clay, orange-white, limonitic Note: includes probable cavings
80 - 81	Clayey Gravel, light grey plus Clay, orange-white, limonitic Note: includes probable cavings
81 - 82	Clayey Gravel, light grey plus Clay, orange-white, limonitic Note: includes probable cavings
82 - 83	Sandy Gravel, grey, poorly sorted, plus Clay, ligneous, black
83 - 84	Sandy Gravel, grey, poorly sorted, plus Clay, ligneous, black
84 - 85 T.D.	Sandy Gravel, grey, poorly sorted, plus Clay, ligneous, black


natural gamma
gamma gamma
METRO QUARRIES - PUMPING BORE #1
YOU YANGS SAND PIT
m
0-1 Soil
1-6 Silty Clay, bn-or
6-24 Sand, very fine White-ltgrey
24-26 Sandy clay, gy-wh
26-27 Clay, wh.
27-31 Sandy Clay, wh, or.
31-32 Gravelly Clay, wh-or.
32-33 Sand, fine, grey
33-34 Clayey Gravel, or
34-35 Clay, or.
35-38 Gravelly Clay, or.
38-39 Clayey Gravel, v.cs, or
39-40 Clay, mottled, or.-wh.
40-43 Clayey Gravel, or-wh.
43-44 Sandy Gravel, gy-or.
44-48 Gravel, v.cs, gy-wh, sl. clayey, well std.
48-57 Clayey Gravel, cs, gy, with clay, wh.
57-59 Gravel, v.cs, gy.
59-61 Gravel-Congl., clayey, gy
61-68 Sandy Gravel, cs, ltgy, plus igneous clay balls
68-71 Sand, cs, md gy,
71-74 Gravel, md gy, poorly std angular
74-82 Clayey Gravel, ltgy, plus Clay, or-wh, possible cavings
82-85 Sandy Gravel, gy, poorly std, plus Clay, igneous, blck
T.D.
8" Class 12 P.V.C.
62.22m
3m 8" Conclamine SS screen
30 # aperture
8" ID ; 8 5/8" O.D.
65.22m
70.22m
4m 8" Conclamine SS Screen
As Above
74.22m
79.08m T.D.


GEELONG - BACCHUS MARSH ROAD
WATER BORE
5 METRE WIDE ACCESS
OVER PUMP LINE AND POWER LINE
C.A. 58
HOUSE
C.A. 59
SANDY CREEK ROAD


WATER BORE
5 METRE WIDE ACCESS
OVER PUMP LINE AND POWER LINE
C.A. 58
HOUSE

Appendix G

Bore logs of former observation bores and bore 105529

Appendix G
Bore logs of former observation bores and bore 105529

Table G.1: Drillers logs of former observation bores and bore 105529

From (m)	To (m)	Description
Bore No. 105531(Bore No. 1)		
0	0.6	Clay and sand
0.6	3.9	Clay and gravel
3.9	4.8	Decomposed granite
4.8	23.7	Grey granite
23.7	35	Dark grey granite
Bore No. 105532 (Bore No. 2)		
0	2.4	Clay and granite sand
2.4	3.9	Granite boulders
3.9	4.8	Decomposed granite
4.8	17	Grey granite
17	17.9	Granite and quartz
17.9	29.2	Grey granite
29.2	31.7	Granite and quartz
31.7	35	Grey granite
Bore No. 105533 (Bore No. 3)		
0	0.6	Top soil
0.6	1.5	Grey sandy clay
1.5	2.4	Brown sandy clay
2.4	3.6	Grey sandy clay
3.6	7.8	Brown sandy clay
7.8	9.4	Yellow clay
9.4	14.7	Clay and gravel
14.7	15.7	Yellow clay
15.7	32.3	Grey granite
32.3	35	Decomposed granite
Bore No. 105530 (Bore No. 4)		
0	0.6	Top soil
0.6	5.7	Grey clay and sand
5.7	7.9	Brown granite
7.9	12.8	Speckled granite
12.8	17	Grey granite
17	35	Light grey granite
Bore No. 105529		
0	0.3	Top soil
0.3	1.5	Brown clay
1.5	3.3	Yellow clay
3.3	6.4	Brown clay
6.4	7.3	Shale
7.3	12.5	Clay and shale
12.5	13.4	Basalt
13.4	24.7	Clay and shale
24.7	31.1	Sandy clay
31.1	37.5	Basalt

Appendix H

Bore logs - OPT-1 to OPT-4

Bore Hole Log - Rock

Bore No.	OPT-1

Client **Barro**
Project **You Yangs**
Logged By **Ik**
Co-ords **274080E 5799932N** MGA Zone 55 (GDA94)
Collar RL **190.0m ( )** Local (Non Earth)
Collar Confidence

Date Drilled **9-Jul-90**
Project No. **B05-047**
Hole Attitude **Vertical**
Drill Type **Gemco 210B**
Hole Size **NQ**
Static Water Level

DEPTH m from	DEPTH m to	MATERIAL	TEXTURE	COLOUR	Alter. S.Al Alt	ROCK CONDITION F SW MW HW XW	DEPTH m	Core Loss	GRAPHIC LOG	TEST RESULTS F.M	TEST RESULTS Sand Content	TEST RESULTS Gravel Content	TEST RESULTS Degrad _Factor	Los Angeles	Comments
0.0	7.3	**Sand - Auger Drilled**					1			3.08	74	15			
							2			2.86	76	6			
							3			2.76	70	4			
							4			2.74	68	2			
							5								
							6								
7.3	21.0	**GRANITE**	coarse				7								
				light grey, white tinge			8								
							9								
							10								
							11						47	*34*	
							12								
				light grey			13								
							14								
							15								
							16								
							17						60	*32*	
							18								
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							39								

REMARKS / ABREVIATIONS
Data Reliability:- Good

F	Fresh	Rock shows no sign of decomposition
SW	Slightly Weathered	Rock is slightly discoloured but generally shows no change from fresh rock
MW	Moderately Weathered	Rock is moderately discoloured, generally showing noticeable change from fresh rock
HW	Highly Weathered	Rock strength visible altered by weathering
XW	Extremely Weathered	Rock weathered to such an extent that it has soil properties

RQD = Rock Quality Description

$$RQD(\%) = \frac{\text{Sum of core pieces > 100mm in length}}{\text{Length of core run}}$$

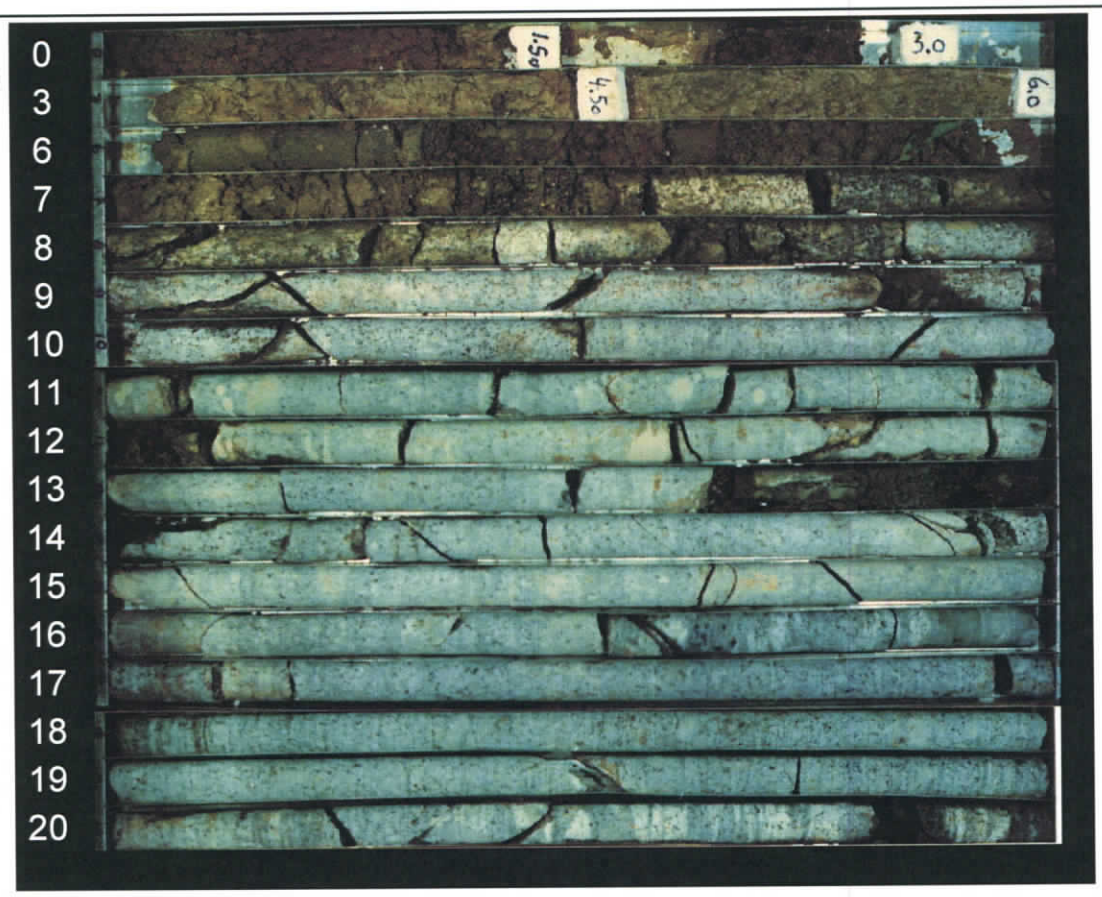
Bore Core Photograph - Rock

BORE No. **OPT-1**

Project: **Barro Group, You Yangs, Vic**

Project No.: **B05-047** Date Drilled: July 1990

From **0.0** to **21.0** (Metres)



Bore Hole Log - Rock

Client	**Barro**
Project	**You Yangs**
Logged By	**Ik**
Co-ords	**274123E 5800311N** MGA Zone 55 (GDA94)
Collar RL	**186.0m ( )** Local (Non Earth)
Collar Confidence	

Bore No. OPT-2

Date Drilled	**16-Jul-90**
Project No.	**B05-047**
Hole Attitude	**Vertical**
Drill Type	**Gemco 210B**
Hole Size	**NQ**
Static Water Level	

DEPTH m from	to	MATERIAL	TEXTURE	COLOUR	Alter: S.Al Alt.	ROCK CONDITION F SW MW HW XW	DEPTH m	Core Loss	GRAPHIC LOG	TEST RESULTS F M	Sand Content	Gravel Content	Degrad _Factor	Los Angeles	Comments
0.0	1.7	**Auger Drilled**													
1.7	12.0	**GRANITE**		light grey, white tinge											
				light grey									74	37	

REMARKS / ABREVIATIONS
Data Reliability:- Good

F	Fresh	Rock shows no sign of decomposition
SW	Slightly Weathered	Rock is slightly discoloured but generally shows no change from fresh rock
MW	Moderately Weathered	Rock is moderately discoloured, generally showing noticeable change from fresh rock
HW	Highly Weathered	Rock strength visible altered by weathering
XW	Extremely Weathered	Rock weathered to such an extent that it has soil properties

RQD = Rock Quality Description

$$RQD(\%) = \frac{\text{Sum of core pieces > 100mm in length}}{\text{Length of core run}}$$

Bore Hole Log - Rock

Bore No.	OPT-3

Client **Barro**
Project **You Yangs**
Logged By **0**
Co-ords **273920E 5800400N** MGA Zone 55 (GDA94)
Collar RL **186.0m ( )** Local (Non Earth)
Collar Confidence

Date Drilled **16-Jul-90**
Project No. **B05-047**
Hole Attitude **Vertical**
Drill Type **Gemco 210B**
Hole Size **NQ**
Static Water Level

DEPTH m from	to	MATERIAL	TEXTURE	COLOUR	Alter. S.Al Alt	ROCK CONDITION F	SW	MW	HW	XW	DEPTH m	Core Loss	GRAPHIC LOG	TEST RESULTS F.M	Sand Content	Gravel Content	Degrad _Factor	Los Angeles	Comments
											1			3.08	78	4			
											2			3.46	81	5			
											3			2.92	77	0			
											4			2.88	81	0			
											5			3.23	79	0			
											6			3.08	80	0			
											7			2.68	77	0			
											8			2.67	76	0			
											9			2.43	72	2			
											10								
											11								
											12								
											13								
											14								
											15								
											16								
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											38								
											39								

REMARKS / ABREVIATIONS
Data Reliability:- Good

F	Fresh	Rock shows no sign of decomposition
SW	Slightly Weathered	Rock is slightly discoloured but generally shows no change from fresh rock
MW	Moderately Weathered	Rock is moderately discoloured, generally showing noticeable change from fresh rock
HW	Highly Weathered	Rock strength visible altered by weathering
XW	Extremely Weathered	Rock weathered to such an extent that it has soil properties

RQD = Rock Quality Description

$$RQD(\%) = \frac{\text{Sum of core pieces > 100mm in length}}{\text{Length of core run}}$$

Bore Core Photograph - Rock

BORE No. **OPT-2**

Project: **Barro Group, You Yangs, Vic**

Project No.: **B05-047** Date Drilled: July 1990

From **0.0** to **12.0** (Metres)

Bore Hole Log - Rock

Client	**Barro**
Project	**You Yangs**
Logged By	**lk**
Co-ords	**275020E 5800750N** MGA Zone 55 (GDA94)
Collar RL	**( )** Local (Non Earth)
Collar Confidence	

Bore No. OPT-4

Date Drilled	**26-Jul-90**
Project No.	**B05-047**
Hole Attitude	**Vertical**
Drill Type	**Gemco 210B**
Hole Size	**NQ**
Static Water Level	

DEPTH m from	DEPTH m to	MATERIAL	TEXTURE	COLOUR	Alter. S.Al Alt	ROCK CONDITION F	SW	MW	HW	XW	DEPTH m	Core Loss	GRAPHIC LOG	TEST RESULTS F.M	Sand Content	Gravel Content	Degrad _Factor	Los Angeles	Comments
0.0	14.4	**Auger Drilled**									1			2.49	75	3			
											2			2.51	73	1			
											3			2.57	65	3			
											4			2.8	66	4			
											5			2.67	60	6			
											6			2.59	64	2			
											7			2.49	63	1			
											8			2.51	61	0			
											9			2.36	56	0			
											10								
											11								
											12								
											13								
14.4	31.7	**GRANITE**	coarse	light grey - pinkish brown							14								
											15								
											16								
											17								
				light grey							18								
											19						61	35	
											20								
				light grey - pinkish brown							21								High crushed zone - soil properties
				light grey							22								
											23								
											24								
			coarse, tight fractures								25								
											26								
											27						57	39	
											28								
											29								
											30								
											31								
											32								
											33								
											34								
											35								
											36								
											37								
											38								
											39								

REMARKS / ABREVIATIONS
Data Reliability:- Good

F	Fresh	Rock shows no sign of decomposition
SW	Slightly Weathered	Rock is slightly discoloured but generally shows no change from fresh rock
MW	Moderately Weathered	Rock is moderately discoloured, generally showing noticeable change from fresh rock
HW	Highly Weathered	Rock strength visible altered by weathering
XW	Extremely Weathered	Rock weathered to such an extent that it has soil properties

RQD = Rock Quality Description

RQD(%) = Sum of core pieces > 100mm in length / Length of core run

Bore Core Photograph - Rock

BORE No. **OPT-4**

Project: **Barro Group, You Yangs, Vic**

Project No.: **B05-047** Date Drilled: July 1990

From **0.0** to **31.7** (Metres)

Appendix I

Licences to Construct Works (WLE080609 & WLE084568)

Works Licence ID:

WLE080609

Printed on: 22 Mar 2021 11:39:03 am

COPY OF RECORD IN THE VICTORIAN WATER REGISTER

LICENCE TO CONSTRUCT WORKS

under Section 67 of the Water Act 1989

The information in this copy of record is as recorded at the time of printing. Current information should be obtained by a search of the register. The State of Victoria does not warrant the accuracy or completeness of this information and accepts no responsibility for any subsequent release, publication or reproduction of this information.

This licence does not remove the need to apply for any authorisation or permission necessary under any other Act of Parliament with respect to anything authorised by the works licence.

Water used under this licence is not fit for any use that may involve human consumption, directly or indirectly, without first being properly treated.

This licence is not to be interpreted as an endorsement of the design and/or construction of any works (including dams). The Authority does not accept any responsibility or liability for any suits or actions arising from injury, loss, damage or death to person or property which may arise from the maintenance, existence or use of the works.

Each person named as a licence holder is responsible for ensuring all the conditions of this licence are complied with.

This licence authorises its holders to construct the described works, subject to the conditions.

Licence Holder(s)

BARRO GROUP PTY LTD of 191 DRUMMOND STREET CARLTON VIC 3053

Licence Contact Details

BARRO GROUP PTY LTD	191 DRUMMOND STREET CARLTON VIC 3053

Licence Details

Expiry date	22 Mar 2022
Status	Active
Authority	Southern Rural Water
Name of waterway or aquifer	NA for construct/decommission
Water system	Unincorporated (GMU)

Summary of Licensed Works

The details in this section are a summary only. They are subject to the conditions specified in this licence.

Works ID	*Works type*	*Use of water*
WRK125709	Bore	Observation

Description of Licensed Works

WORKS ID WRK125709

Works type	Bore
Works subtype	Drilled bore
Proposed maximum depth	Unrestricted

Works location

Easting	*Northing*	*Zone MGA*
273604.893	5800386.151	Zone 55

Land description

Volume 10275 Folio 234
Lot 2 of Plan PS344713R

Property address

250 DRYSDALE ROAD, LITTLE RIVER, VIC 3211

Related Instruments

Related entitlements	Nil
Related water-use entities	Nil

Application History

Reference	*Type*	*Status*	*Lodged date*	*Approved date*	*Recorded date*
WLI614600	Issue	Approved	22 Mar 2021	22 Mar 2021	

Conditions

Licence WLE080609 is subject to the following conditions:

Siting and construction

1 The bore(s) must be drilled at the location specified in the application approved by the Authority.

2 If after drilling the bore is considered unsatisfactory a replacement bore may be drilled on the land specified in the licence.

Preventing pollution

3 All earthworks must be carried out, and all drilling fluids and waters produced during construction and development must be disposed of, in ways that avoid contaminating native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

4 Construction must stop immediately if the Authority reasonably believes that fuel, lubricant, drilling fluid, soil or water produced during construction and development is at risk of being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

5 The licence holder must construct and maintain bund walls, in accordance with the timeframe, specifications, guidelines or standards prescribed by the Authority, to prevent fuel, lubricant, drilling fluid, soil or water produced during construction and development from being spilled into native vegetation, waterways, aquifers, the riparian environment, the riverine environment or other people's property.

Drilling licence and supervision requirements

6 The bore(s) must be constructed by, or under the direct supervision of, a driller licensed under the Water Act 1989 and endorsed as a Class 2 or 3 driller, with appropriate endorsements.

7 If artesian pressure is expected or encountered, then a driller licensed under the Water Act 1989, and endorsed as a class 3 driller, must install casing in the bore(s) to a suitable depth, and in a suitable manner, to prevent its outbreak. A suitable valve must also be fitted to the bore.

Bore completion report

8 A Bore Completion Report must be submitted to the Authority within 28 working days of the bore(s) being completed.

Protecting water resources

9 No more than 1 bore(s) may be brought to final development under this licence.

10 At the completion of drilling and before the drilling rig leaves the site, all but 1 bore(s) must be decommissioned so as to eliminate physical hazards, conserve aquifer yield, prevent groundwater contamination and prevent the intermingling of desirable and undesirable waters.

11 The bore(s) must be located at least 30 metres from any authority's channel, reserve or easement unless authorised by the Authority.

Protecting water quality

12 Drilling must not exceed the maximum depth.

13 The bore(s) must be constructed so as to prevent aquifer contamination caused by vertical flow outside the casing.

14 If two or more aquifers are encountered, the bore(s) must be constructed to ensure that an impervious seal is made and maintained between each aquifer to prevent aquifer connection through vertical flow outside the casing; under no circumstances are two or more aquifers to be screened within the one bore or in any other manner to allow connection between them.

15 Boreheads must be constructed, to ensure that no flood water, surface runoff or potential subsurface contaminated soakage can enter the bore or bore annulus.

Protecting other water users

16 The diameter of the drill casing must not exceed 130 millimetres.

17 The bore(s) must be constructed so that water levels in the bore(s) can be measured by an airline, a piezometer or a method approved in writing by the Authority.

Fees and charges

18 The licence holder must, when requested by the Authority, pay all fees, costs and other charges under the Water Act 1989 in respect of this licence.

END OF COPY OF RECORD

Appendix J

Bore logs – BH01, BH02, BH03 and BH04

ENVIRONMENTAL WELL BH01

Valenza Engineering

PROJECT NUMBER 350	**DRILLING COMPANY** Statewide Drilling Pty Ltd	**COORDINATES** E: 273910.18; N: 5799888.19
PROJECT NAME Little River Quarry	**DRILLER** Mr T. Hately	**COORD SYS** GDA 94
CLIENT Barro Group Pty. Ltd	**DRILL RIG**	**SURFACE ELEVATION** 202.15 (mAHD)
ADDRESS Sandy Creek Rd, Little River	**DRILLING METHOD** Diamond Coring	**WELL TOC** 203.03 (mAHD)
DRILLING DATE 10/03/2021	**TOTAL DEPTH** 150 m	**LOGGED BY** K. Lewis
LICENCE NO.	**DIAMETER** 50 mm	**CHECKED BY** A. Valenza

COMPLETION 0.88 m stick up with monument | **CASING** 50 mm Class 12 uPVC | **SCREEN** 12 m x 0.4 mm at 5 mm interval slotted

COMMENTS Well installed with 12 m screen (138 m - 150 m); bent. grout from 0 m to 3 m and cemented from 3 mBGL to 39 mBGL. No filter pack.

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Weathering	Material Description	Diameter	Formation	Elevation (mAHD)
0	DC					Core Loss.	HQ		200
					HW	GRANITE, with clay: brownish Grey.			
5									195
10									190
15									185
20									180
25									175
30									170
					MW	GRANITE: brownish Grey.			
35					SW				165
					MW	GRANITE: Grey.			
40							NQ		160
					F				
45									155
50									

Disclaimer This bore log is intended for environmental not geotechnical purposes.

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ENVIRONMENTAL WELL BH01

Valenza Engineering

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Weathering	Material Description	Diameter	Formation	Elevation (mAHD)
55									150
60									145
65		▽							140
70									135
75									130
80					MW				125
85									120
90					SW				115
95					F				110
100					MW				105
105					F				100
110									95

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 07 Jul 2021

ENVIRONMENTAL WELL BH01

Valenza Engineering

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Weathering	Material Description	Diameter	Formation	Elevation (mAHD)
115									85
120									80
125									75
130									70
135					MW				65
140					F				60
145									55
150						Termination Depth at 150 m. No filter pack installed. Due to DC method water strike was not identified. Water level reading of 64.66 mBTOC (138.37 mAHD) on the 27/04/2021.			50
155									45
160									40
165									35
170									30

Disclaimer This bore log is intended for environmental not geotechnical purposes.

produced by ESlog.ESdat.net on 07 Jul 2021

Diamond Log

Client	**Barro**		Bore No. **YY21-DDH01**
Project	**You Yangs**		Date Drilled **10-Mar-21**
Logged By	**Hugh McCutcheon**	Drilled By **Statewide**	Project No. **B05-047**
Co-ords		MGA Zone 55 (GDA94)	Drill Type
Collar RL	**( )**	Local (Non Earth)	Hole Attitude **Vertical**
Hole Depth	**150.0m**	Collar Confidence **Good**	Hole Size
			Measured Water Level

AHD (m)	Interval m from	to	MATERIAL	TEXTURE	COLOUR	Alter. S.Al	Alt	ROCK CONDITION F	SW	MW	HW	XW	Downhole Depth m	Core Loss	FRACTURE RQD (%) 100 50 0	SMC	Deg (%)	LA (%)	PD ssd (t/m3)	Comments	Assigned Quality
m																					
	0.0	1.0	**Core Loss**																		
	1.0	32.5	**GRANITE + CLAY**		gy/bn								1							HQ Drilliing	
													2								
													3								
													4								
													5								
													6								
													7								
													8								
													9								
													10								
													11								
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													24								
													25								
													26								
													27								
													28								
													29								
													30								
													31								
	32.5	150.0	**GRANITE**										32								
													33								
													34								
													35								
													36								
					gy								37								
													38								
													39								

REMARKS / ABBREVIATIONS

Data Reliability:- Fair Water bore

F	Fresh	Rock shows no sign of decomposition
SW	Slightly Weathered	Rock is slightly discoloured but generally shows no change from fresh rock
MW	Moderately Weathered	Rock is moderately discoloured, generally showing noticeable change from fresh rock
HW	Highly Weathered	Rock strength visible altered by weathering
XW	Extremely Weathered	Rock weathered to such an extent that it has soil properties

RQD = Rock Quality Description

RQD(%) = Sum of core pieces > 100mm in / Length of core run

Diamond Log

Client	**Barro**		Bore No. **YY21-DDH01**
Project	**You Yangs**		Date Drilled **10-Mar-21**
Logged By	**Hugh McCutcheon**	Drilled By **Statewide**	Project No. **B05-047**
Co-ords		MGA Zone 55 (GDA94)	Drill Type
Collar RL	**( )**	Local (Non Earth)	Hole Attitude **Vertical**
Hole Depth	**150.0m**	Collar Confidence **Good**	Hole Size
			Measured Water Level

AHD (m)	Interval m from	to	MATERIAL	TEXTURE	COLOUR	Alter. S.Al	Alt	ROCK CONDITION F	SW	MW	HW	XW	Downhole Depth m	Core Loss	FRACTURE RQD (%) 100 50 0	SMC	Deg (%)	LA (%)	PD ssd (t/m3)	Comments	Assigned Quality
m																					
	32.5	150.0	**GRANITE**		gy								41							Near vertical fracture	
													42								
													43								
													44								
													45								
													46								
													47								
													48								
													49								
													50								
													51								
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													72								
													73								
													74								
													75								
													76								
													77								
													78								
													79							Near vertical fractures	

REMARKS / ABBREVIATIONS

Data Reliability:- Fair Water bore

F	Fresh	Rock shows no sign of decomposition
SW	Slightly Weathered	Rock is slightly discoloured but generally shows no change from fresh rock
MW	Moderately Weathered	Rock is moderately discoloured, generally showing noticeable change from fresh rock
HW	Highly Weathered	Rock strength visible altered by weathering
XW	Extremely Weathered	Rock weathered to such an extent that it has soil properties

RQD = Rock Quality Description

RQD(%) = Sum of core pieces > 100mm in / Length of core run

Diamond Log

Bore No. **YY21-DDH01**

Client **Barro**
Project **You Yangs**
Logged By **Hugh McCutcheon** Drilled By **Statewide**
Co-ords MGA Zone 55 (GDA94)
Collar RL **( )** Local (Non Earth)
Hole Depth **150.0m** Collar Confidence **Good**

Date Drilled **10-Mar-21**
Project No. **B05-047**
Drill Type
Hole Attitude **Vertical**
Hole Size
Measured Water Level

AHD (m)	Interval m from	Interval m to	MATERIAL	TEXTURE	COLOUR	Alter. S.Al	Alter. Alt	ROCK CONDITION F	SW	MW	HW	XW	Downhole Depth m	Core Loss	FRACTURE RQD (%) 100 50 0	SMC	Deg (%)	LA (%)	PD ssd (t/m3)	Comments	Assigned Quality
m	from	to																			
	32.5	150.0	**GRANITE**		gy								81							Near vertical fractures	
													82								
													83								
													84								
													85								
													86								
													87								
													88								
													89								
													90								
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													115								
													116								
													117								
													118								
													119								

REMARKS / ABBREVIATIONS
Data Reliability:- Fair Water bore

F	Fresh	Rock shows no sign of decomposition
SW	Slightly Weathered	Rock is slightly discoloured but generally shows no change from fresh rock
MW	Moderately Weathered	Rock is moderately discoloured, generally showing noticeable change from fresh rock
HW	Highly Weathered	Rock strength visible altered by weathering
XW	Extremely Weathered	Rock weathered to such an extent that it has soil properties

RQD = Rock Quality Description

RQD(%) = Sum of core pieces > 100mm in / Length of core run

Diamond Log

Bore No. **YY21-DDH01**

Client **Barro**
Project **You Yangs**
Logged By **Hugh McCutcheon** Drilled By **Statewide**
Co-ords MGA Zone 55 (GDA94)
Collar RL **( )** Local (Non Earth)
Hole Depth **150.0m** Collar Confidence **Good** Measured Water Level

Date Drilled **10-Mar-21**
Project No. **B05-047**
Drill Type
Hole Attitude **Vertical**
Hole Size

AHD (m)	Interval m		MATERIAL	TEXTURE	COLOUR	Alter.	ROCK CONDITION					Downhole Depth m	Core Loss	FRACTURE RQD (%)	SMC	Deg (%)	LA (%)	PD ssd (t/m3)	Comments	Assigned Quality
m	from	to				S.Al Alt	F	SW	MW	HW	XW			100 50 0						
	32.5	150.0	**GRANITE**		gy							121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159							Fractures	

REMARKS / ABBREVIATIONS
Data Reliability:- Fair Water bore

F	Fresh	Rock shows no sign of decomposition
SW	Slightly Weathered	Rock is slightly discoloured but generally shows no change from fresh rock
MW	Moderately Weathered	Rock is moderately discoloured, generally showing noticeable change from fresh rock
HW	Highly Weathered	Rock strength visible altered by weathering
XW	Extremely Weathered	Rock weathered to such an extent that it has soil properties

RQD = Rock Quality Description

RQD(%) = Sum of core pieces > 100mm in / Length of core run

Bore Core Photograph - Rock

BORE No. **YY21-DDH01**

Project: **Little River, You Yangs , Vic**

Project No.: B05-047 Date Drilled: 10/03/ 2021 From **0.0** to **150.0** (Metres)

Bore Core Photograph - Rock

BORE No. **YY21-DDH01**

Project: **Little River, You Yangs , Vic**

Project No.: B05-047 Date Drilled: 10/03/ 2021 From **0.0** to **150.0** (Metres)

Bore Core Photograph - Rock

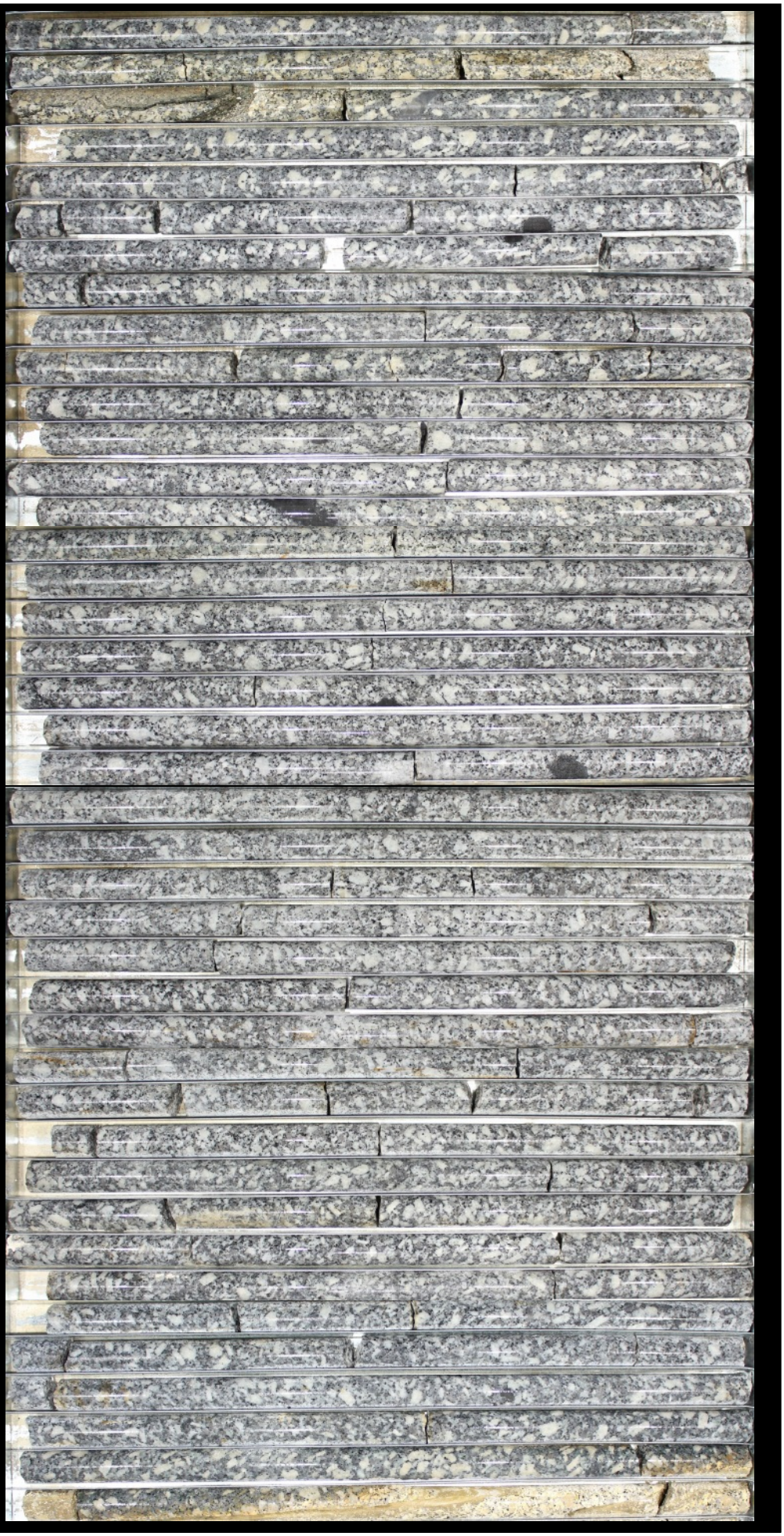
BORE No. **YY21-DDH01**

Project: **Little River, You Yangs , Vic**

Project No.: B05-047 Date Drilled: 10/03/ 2021 From **0.0** to **150.0** (Metres)

Depth (Metres)

39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79

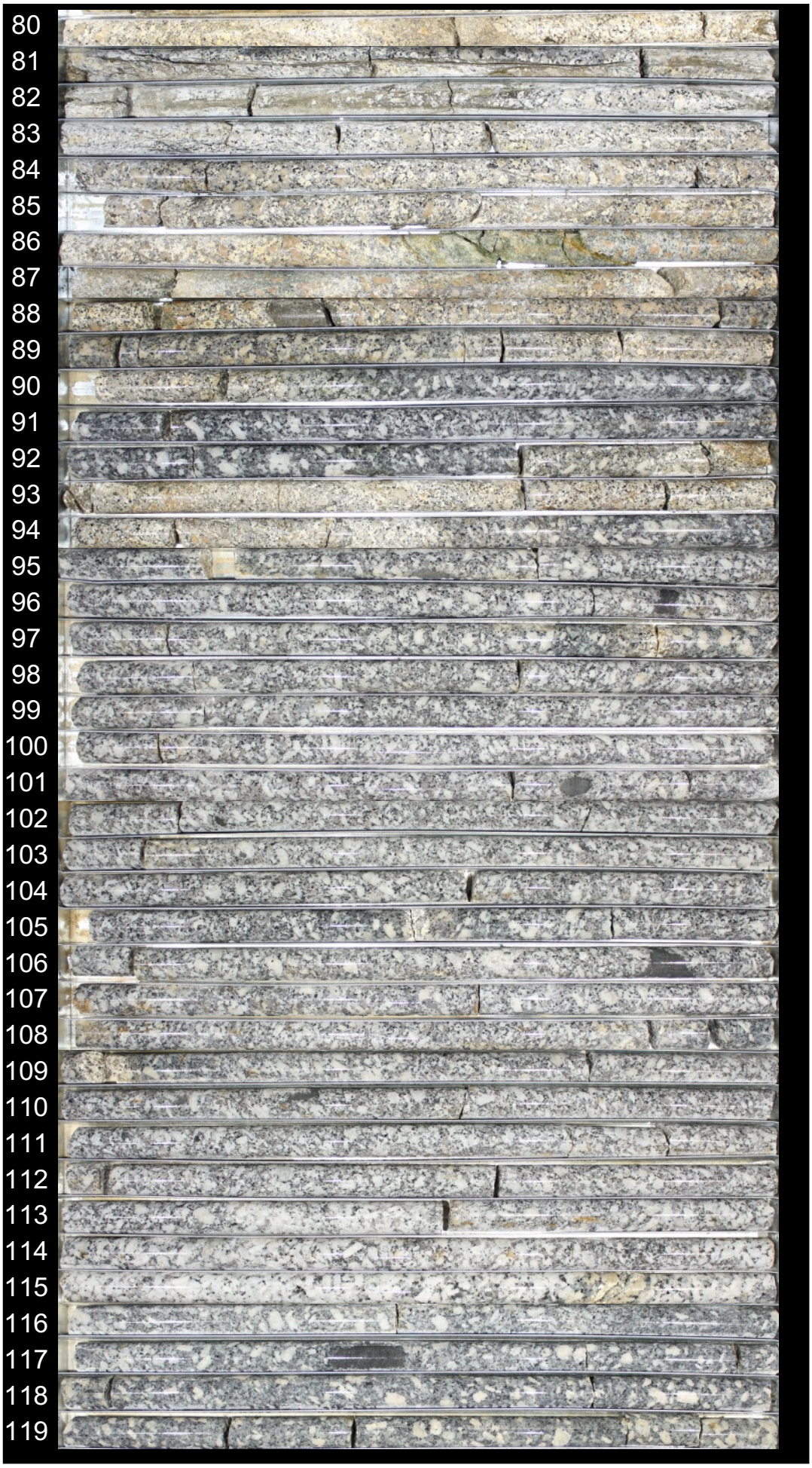


Bore Core Photograph - Rock

BORE No. **YY21-DDH01**

Project: **Little River, You Yangs , Vic**

Project No.: B05-047 Date Drilled: 10/03/ 2021 From **0.0** to **150.0** (Metres)

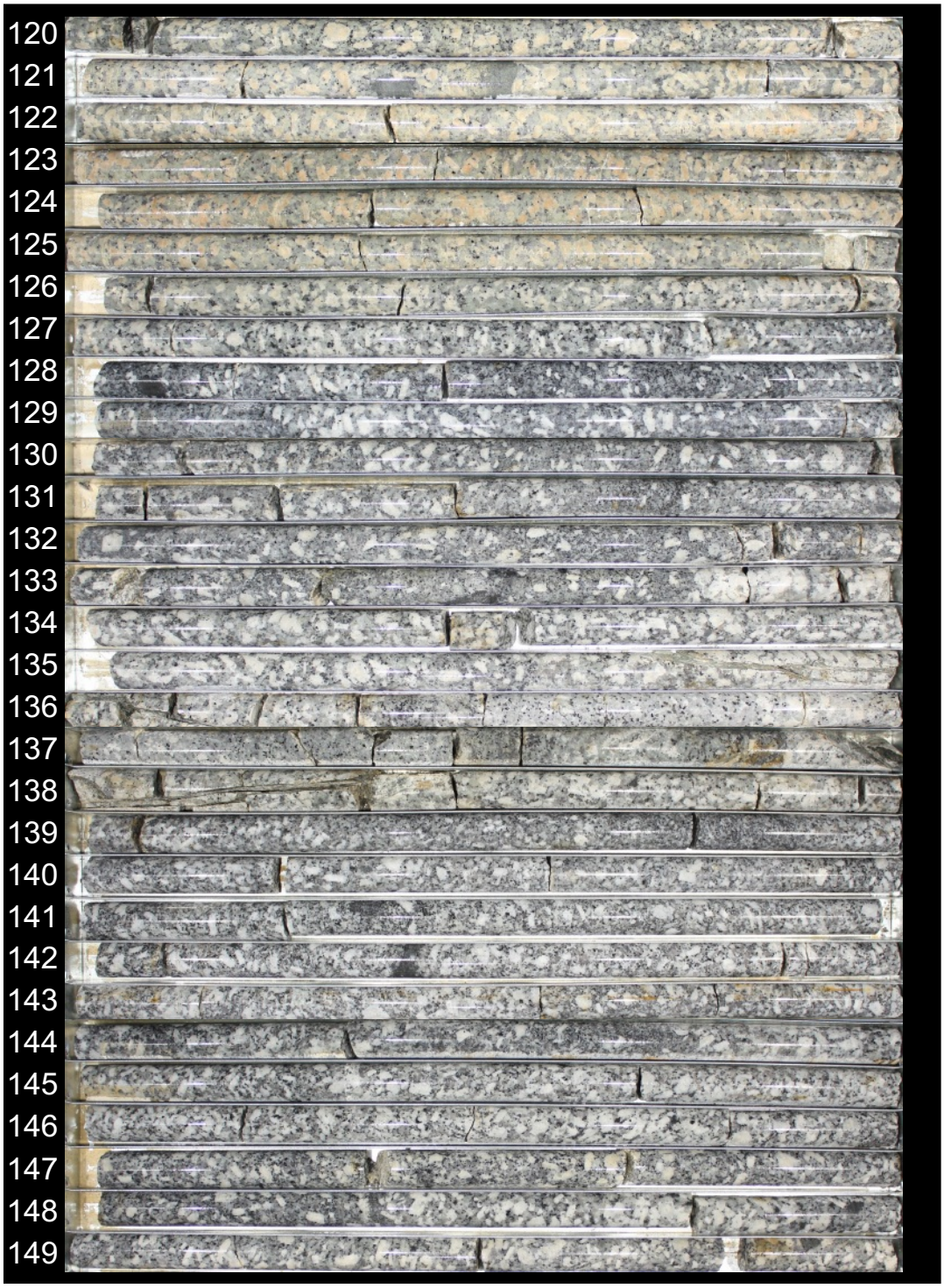


Bore Core Photograph - Rock

BORE No. **YY21-DDH01**

Project: **Little River, You Yangs , Vic**

Project No.: B05-047 Date Drilled: 10/03/ 2021 From **0.0** to **150.0** (Metres)



ENVIRONMENTAL WELL BH02

PROJECT NUMBER 395	**DRILLING COMPANY** Star Drilling	**COORDINATES** E: 273559.15; N: 5799956.31
PROJECT NAME Little River Quarry	**DRILLER** Callum Simpson	**COORD SYS** MGA94
CLIENT Barro Group Pty Ltd	**DRILLING METHOD** Air Hammer	**SURFACE ELEVATION** 202.53 (mAHD)
ADDRESS Sandy Creek Road, Little River	**TOTAL DEPTH** 145 m	**WELL TOC** 203.32 (mAHD)
COMPLETION DATE 21/12/2022	**DIAMETER** 50 mm	**LOGGED BY** J. Reivers
WORKS ID WRK135354	**WORKS LICENCE ID** WLE084568	**CHECKED BY** J. Goddard

COMPLETION 0.79 m stick up with monument | **CASING** 50 mm Class 18 uPVC | **SCREEN** 45 m x 0.4 mm at 5 mm interval slotted

COMMENTS Well installed with 45 m screen (100m - 145m); cement grout from 0m to 95m; bentonite from 95m to 99m; packers from 99m to 100m

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
0	AH				Clayey SAND, brown, medium grained, moist, dense, minor angular gravel (granite and quartz)	Fill	200
5					GRANITE, light grey (white and dark grains), dry	You Yangs Granite	195
10							190
15		▽					185
20							180
25							175
30							170
35					GRANITE, grey (white and dark grains), moist		165
40					GRANITE, grey brown (white and dark grains), moist		160
45					GRANITE, grey (white and dark grains), moist		155
50							

Disclaimer This bore log is intended for environmental not geotechnical purposes.

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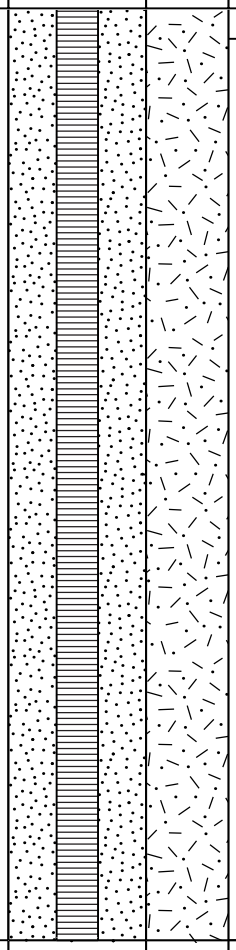
ENVIRONMENTAL WELL BH02

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
55							150
60							145
65							140
70							135
75					GRANITE, grey (white and dark grains), loose, sub-angular gravel fragments (<6mm), wet		130
80							125
85							120
90					GRANITE, orange pink (white and dark grains), loose, sub-angular gravel fragments (<10mm), wet		115
95							110
100							105
105							100
110							95

produced by ESlog.ESdat.net on 16 Feb 2023

ENVIRONMENTAL WELL BH02

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
115					GRANITE, orange pink (white and dark grains), loose, fine gravel fragments, wet		90
120							85
125							80
130							75
135							70
140							65
145							60
150					Termination Depth at 145 m. Due to AH method water strike was not identified. Water level reading of 16.714 mbtoc on the 14/02/2022.		55
155							50
160							45
165							40
170							35
							30

produced by ESlog.ESdat.net on 16 Feb 2023

ENVIRONMENTAL WELL BH03

PROJECT NUMBER 395	**DRILLING COMPANY** Star Drilling	**COORDINATES** E: 273853.25; N: 5800627.89
PROJECT NAME Little River Quarry	**DRILLER** Callum Simpson	**COORD SYS** MGA94
CLIENT Barro Group Pty Ltd	**DRILLING METHOD** Air Hammer	**SURFACE ELEVATION** 171.28 (mAHD)
ADDRESS Sandy Creek Road, Little River	**TOTAL DEPTH** 120 m	**WELL TOC** 172.13 (mAHD)
COMPLETION DATE 16/01/2023	**DIAMETER** 50 mm	**LOGGED BY** J. Reivers
WORKS ID WRK135353	**WORKS LICENCE ID** WLE084568	**CHECKED BY** J. Goddard

COMPLETION 0.85 m stick up with monument | **CASING** 50 mm Class 18 uPVC | **SCREEN** 18 m x 0.4 mm at 5 mm interval slotted

COMMENTS Well installed with 18 m screen (102m - 120m); cement grout from 0m to 98m; bentonite from 98m to 100m

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
0	AH	▽			GRANITE, light grey (white and dark grains), dry	You Yangs Granite	170
5							165
10							160
15							155
20							150
25							145
30							140
35					GRANITE, light grey (white and dark grains), slightly weathered, dry		135
40							130
45							125
50							

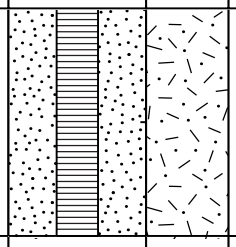
produced by ESlog.ESdat.net on 16 Feb 2023

ENVIRONMENTAL WELL BH03

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
55					GRANITE, light grey (white and dark grains), slightly weathered, moist		120
60							115
65							110
70							105
75					GRANITE, brown orange (white and dark grains), moist		100
80					GRANITE, brown orange (white and dark grains), increased moist		95
85					GRANITE, grey white (white and dark grains), increased moist		90
90							85
95							80
100							75
105							70
110							65
							60

produced by ESlog.ESdat.net on 16 Feb 2023

ENVIRONMENTAL WELL BH03

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
115							55
120					Termination Depth at 120 m. Due to AH method water strike was not identified. Water level reading of 9.105 mbtoc on the 14/02/2022.		50
125							45
130							40
135							35
140							30
145							25
150							20
155							15
160							10
165							5
170							0

produced by ESlog.ESdat.net on 16 Feb 2023

ENVIRONMENTAL WELL BH04

PROJECT NUMBER 395	**DRILLING COMPANY** Star Drilling	**COORDINATES** E: 274616.16; N: 5799932.09
PROJECT NAME Little River Quarry	**DRILLER** Callum Simpson	**COORD SYS** MGA94
CLIENT Barro Group Pty Ltd	**DRILLING METHOD** Air Hammer	**SURFACE ELEVATION** 219.99 (mAHD)
ADDRESS Sandy Creek Road, Little River	**TOTAL DEPTH** 160 m	**WELL TOC** 220.55 (mAHD)
COMPLETION DATE 16/01/2023	**DIAMETER** 50 mm	**LOGGED BY** J. Reivers
WORKS ID WRK135355	**WORKS LICENCE ID** WLE084568	**CHECKED BY** J. Goddard

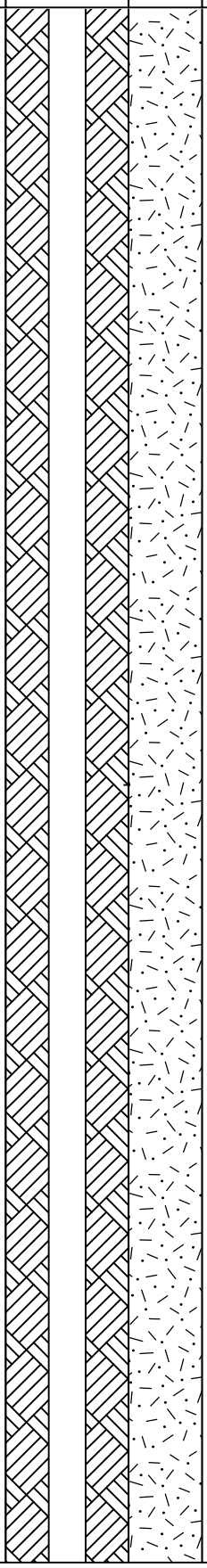
COMPLETION 0.56 m stick up with monument **CASING** 50 mm Class 18 uPVC **SCREEN** 18 m x 0.4 mm at 5 mm interval slotted

COMMENTS Well installed with 18 m screen (142m - 160m); cement grout from 0m to 135m; bentonite from 135m to 140m

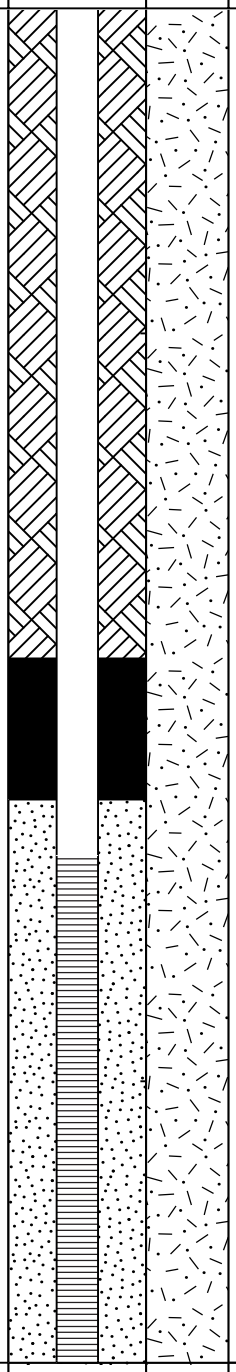
Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
0	AH				GRANITE, light to medium grey, fine grained fragments, angular fragments <2mm, dry	You Yangs Granite	220
5							215
					GRANITE, light to medium grey, fine grained fragments, angular fragments <5mm, dry		
10					GRANITE, brown grey, fine grained fragments, angular fragments <1mm, dry		210
15							205
					GRANITE, grey, fine grained fragments, angular fragments <5mm, dry		
20							200
		▽			GRANITE, grey white, fine grained fragments, angular fragments <5mm, dry		
25					GRANITE, brown grey, fine grained fragments, angular fragments <5mm, dry		195
					GRANITE, grey white, fine grained fragments, angular fragments <5mm, dry		
30							190
35							185
40							180
45							175
50							170

produced by ESlog.ESdat.net on 23 Feb 2023

ENVIRONMENTAL WELL BH04

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
55							165
60							160
65							155
70							150
75							145
80							140
85							135
90							130
95							125
100							120
105							115
110							110

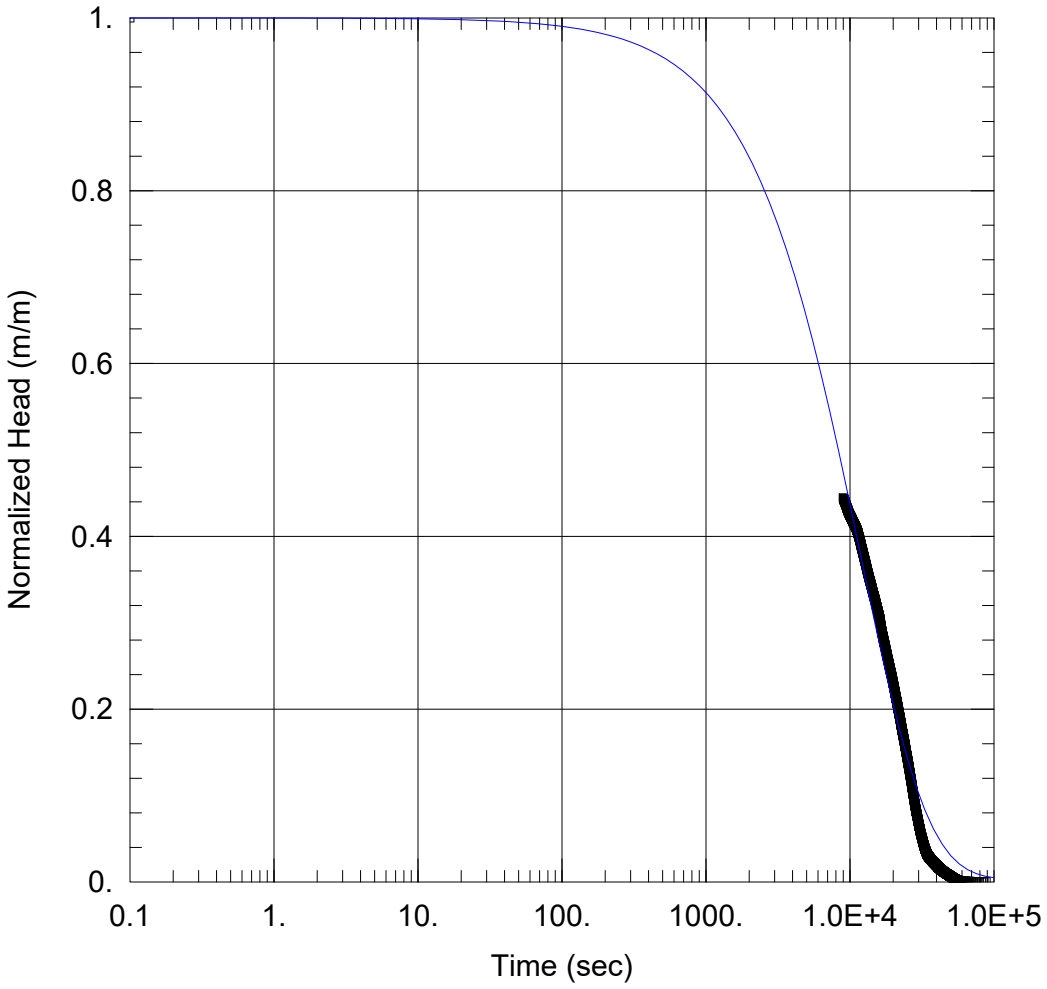
ENVIRONMENTAL WELL BH04

Depth (m)	Drilling Method	Water	Well Installation	Graphic Log	Material Description	Formation	Elevation (mAHD)
115							105
120							100
125							95
130							90
135							85
140							80
145							75
150							70
155							65
160					Termination Depth at 160 m. Due to AH method water strike was not identified. Water level reading of 23.670 mbtoc on the 14/02/2022.		60
165							55
170							50

produced by ESlog.ESdat.net on 23 Feb 2023

Appendix K

Hydraulic conductivity test analyses



WELL TEST ANALYSIS

Data Set: C:\...\RHT_1_AV.aqt
Date: 07/07/21 Time: 18:33:20

PROJECT INFORMATION

Company: Valenza Engineering
Client: Barro Pty Ltd
Project: 350
Location: Little River
Test Well: BH01
Test Date: 21/04/1021

AQUIFER DATA

Saturated Thickness: 67.93 m Anisotropy Ratio (Kz/Kr): 0.1

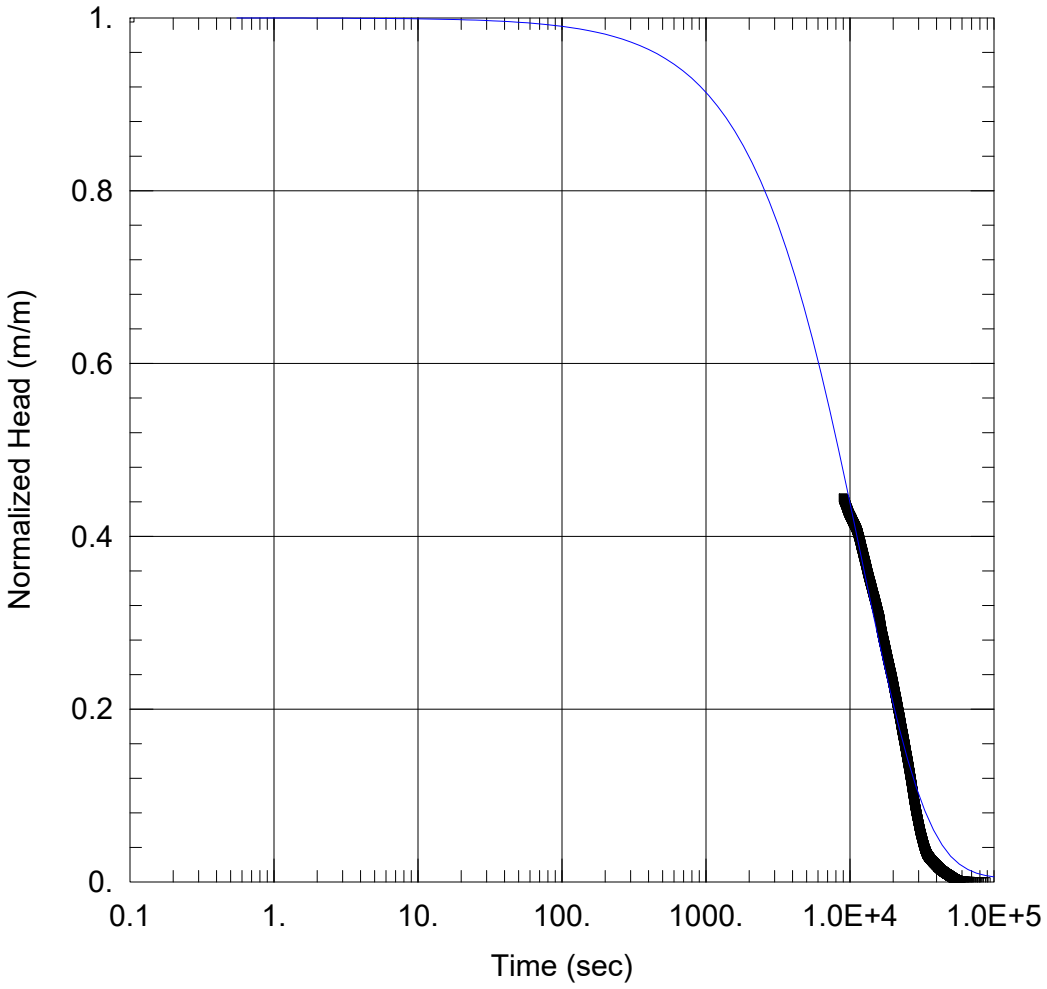
WELL DATA (BH01)

Initial Displacement: 4.25 m
Total Well Penetration Depth: 67.93 m
Casing Radius: 0.0385 m
Static Water Column Height: 67.93 m
Screen Length: 67.93 m
Well Radius: 0.0385 m

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 9.675E-7 m^2/sec
S = 1.0E-13



WELL TEST ANALYSIS

Data Set: C:\...\RHT_1_AV.aqt
Date: 07/07/21 Time: 18:39:03

PROJECT INFORMATION

Company: Valenza Engineering
Client: Barro Pty Ltd
Project: 350
Location: Little River
Test Well: BH01
Test Date: 21/04/1021

AQUIFER DATA

Saturated Thickness: 67.93 m Anisotropy Ratio (Kz/Kr): 0.1

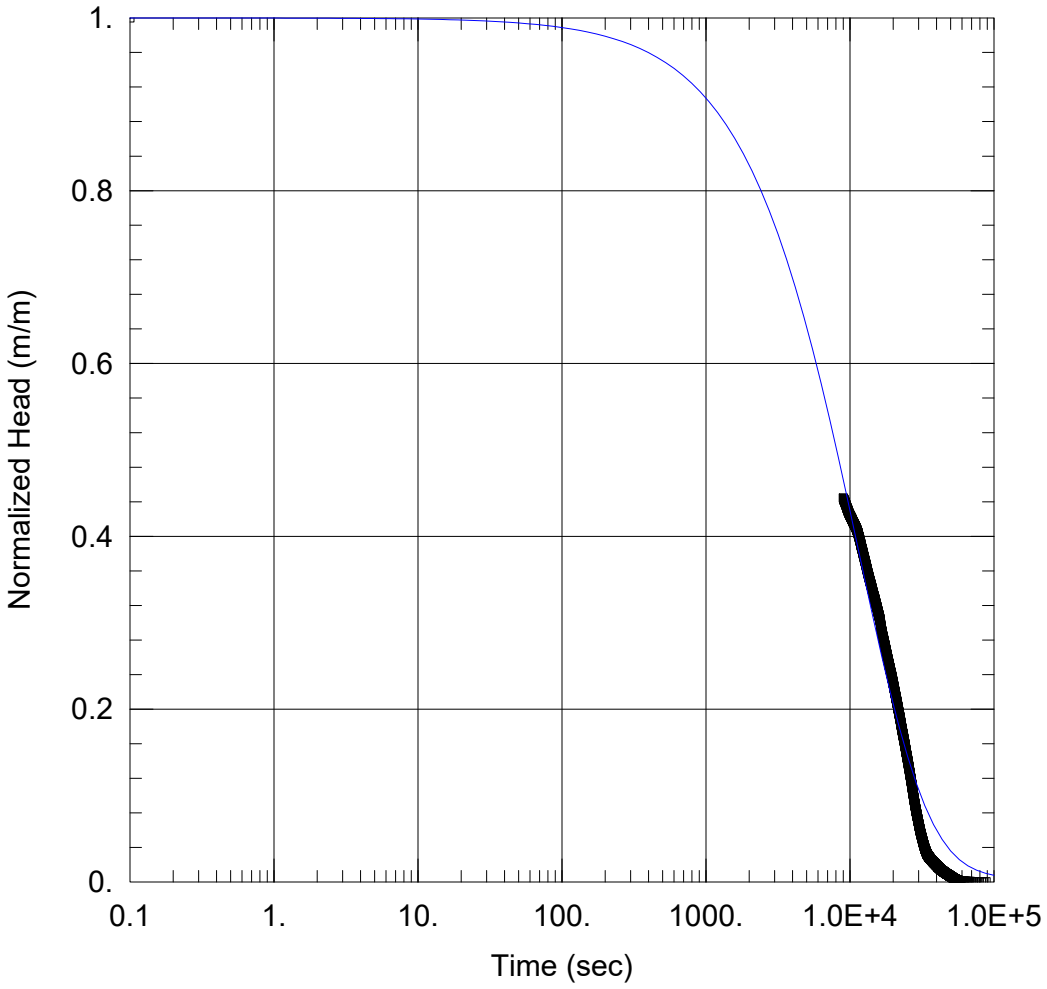
WELL DATA (BH01)

Initial Displacement: 4.25 m
Total Well Penetration Depth: 67.93 m
Casing Radius: 0.0385 m
Static Water Column Height: 67.93 m
Screen Length: 67.93 m
Well Radius: 0.0385 m

SOLUTION

Aquifer Model: Confined
Solution Method: Butler-Zhan

Kr = 1.42E-8 m/sec
Kz/Kr = 0.1
Ss = 1.472E-15 m^{-1}
Le = 74.5 m



WELL TEST ANALYSIS

Data Set: C:\...\RHT_1_AV.aqt
Date: 07/07/21 Time: 18:41:15

PROJECT INFORMATION

Company: Valenza Engineering
Client: Barro Pty Ltd
Project: 350
Location: Little River
Test Well: BH01
Test Date: 21/04/1021

AQUIFER DATA

Saturated Thickness: 67.93 m Anisotropy Ratio (Kz/Kr): 0.1

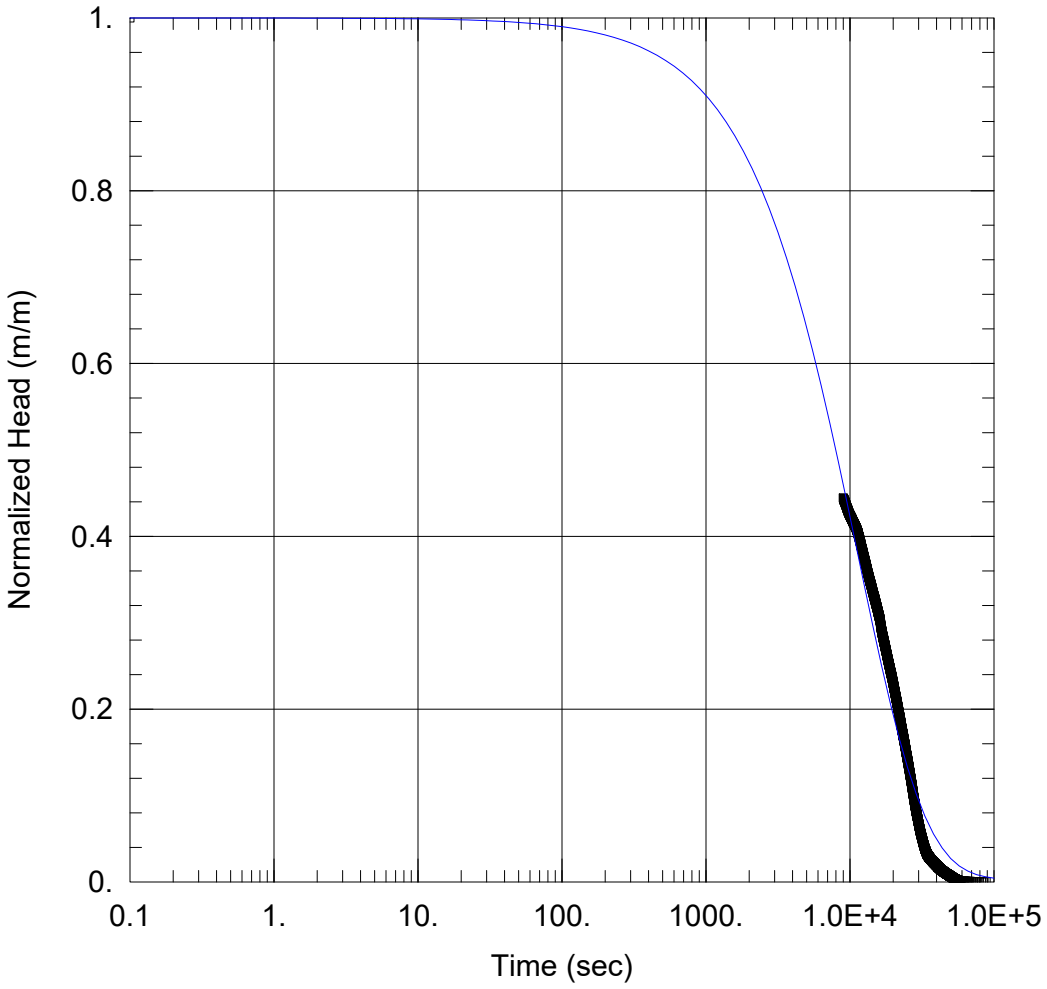
WELL DATA (BH01)

Initial Displacement: 4.25 m
Total Well Penetration Depth: 67.93 m
Casing Radius: 0.0385 m
Static Water Column Height: 67.93 m
Screen Length: 67.93 m
Well Radius: 0.0385 m

SOLUTION

Aquifer Model: Fractured Solution Method: Barker-Black

T = 6.338E-7 m^2/sec
K' = 1.0E-10 m/sec
S = 1.0E-13
Ss' = 1.0E-10 m^{-1}



WELL TEST ANALYSIS

Data Set: C:\...\RHT_1_AV.aqt
Date: 07/07/21 Time: 18:43:41

PROJECT INFORMATION

Company: Valenza Engineering
Client: Barro Pty Ltd
Project: 350
Location: Little River
Test Well: BH01
Test Date: 21/04/1021

AQUIFER DATA

Saturated Thickness: 67.93 m

WELL DATA (BH01)

Initial Displacement: 4.25 m
Total Well Penetration Depth: 67.93 m
Casing Radius: 0.0385 m
Static Water Column Height: 67.93 m
Screen Length: 67.93 m
Well Radius: 0.0385 m

SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 1.485E-8 m/sec
Kz/Kr = 0.1
Ss = 1.472E-15 m^{-1}

Appendix L

ALS Environmental Certificate of Analyses

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2107641**	Page	: 1 of 3
Client	: **VALENZA ENGINEERING**	Laboratory	: Environmental Division Melbourne
Contact	: KEITH LEWIS	Contact	: Gregory Gommers
Address	: 101/620 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: 350 Little River GW	Date Samples Received	: 29-Apr-2021 14:20
Order number	: -	Date Analysis Commenced	: 29-Apr-2021
C-O-C number	: 22161	Issue Date	: 05-May-2021 18:28
Sampler	: KEITH LEWIS		
Site	: 350 Little River		
Quote number	: ME-205-21		
No. of samples received	: 2		
No. of samples analysed	: 1		

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Accredited for compliance with
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This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Arenie Vijayaratnam	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	MW01	----	----	----	----
				Sampling date / time	29-Apr-2021 12:22	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2107641-001	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**8.34**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**1350**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**164**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**164**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**108**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**646**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**75**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**18**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**340**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**18**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Manganese	7439-96-5	0.001	mg/L		**0.045**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.20**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.96**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**23.7**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**20.5**	----	----	----	----
ø Ionic Balance	----	0.01	%		**7.40**	----	----	----	----

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2102932**	Page	: 1 of 6
Client	: **VALENZA ENGINEERING**	Laboratory	: Environmental Division Melbourne
Contact	: KEITH LEWIS	Contact	: Customer Services EM
Address	: 101/620 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: Little River 350	Date Samples Received	: 24-Feb-2021 19:00
Order number	: -	Date Analysis Commenced	: 24-Feb-2021
C-O-C number	: 19505	Issue Date	: 03-Mar-2021 16:41
Sampler	: KEITH LEWIS		
Site	: Little River 350		
Quote number	: ME/069/21		
No. of samples received	: 12		
No. of samples analysed	: 12		

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Signatories	*Position*	*Accreditation Category*
Arenie Vijayaratnam	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA015H: EM2102932 #2-4: TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	Dam Bottom	Dam Top	Pit Sump	QC1	----
				Sampling date / time	24-Feb-2021 10:27	24-Feb-2021 10:39	24-Feb-2021 10:39	24-Feb-2021 11:05	----
Compound	CAS Number	LOR	Unit		EM2102932-001	EM2102932-002	EM2102932-003	EM2102932-004	--------
					Result	Result	Result	Result	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		9.14	9.26	8.21	9.20	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		990	15100	2080	16300	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		6.1	134	267	133	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		63	73	<1	67	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		102	84	217	91	----
Total Alkalinity as CaCO3	----	1	mg/L		164	157	217	158	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		119	8350	147	8340	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		379	1900	513	1920	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		14	619	21	636	----
Magnesium	7439-95-4	1	mg/L		33	760	29	781	----
Sodium	7440-23-5	1	mg/L		266	2300	424	2280	----
Potassium	7440-09-7	1	mg/L		17	2200	20	2180	----
EG020T: Total Metals by ICP-MS									
Copper	7440-50-8	0.001	mg/L		0.002	<0.001	0.002	<0.001	----
Manganese	7439-96-5	0.001	mg/L		<0.001	0.191	0.093	0.195	----
Molybdenum	7439-98-7	0.001	mg/L		0.046	0.006	0.086	0.006	----
Zinc	7440-66-6	0.005	mg/L		0.007	0.007	<0.005	<0.005	----
Boron	7440-42-8	0.05	mg/L		0.08	1.48	0.14	1.43	----
Iron	7439-89-6	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.09	0.10	1.56	0.10	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		0.52	<0.01	1.86	<0.01	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		18.7	<0.01	46.9	<0.01	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	Dam Bottom	Dam Top	Pit Sump	QC1	----
				Sampling date / time	24-Feb-2021 10:27	24-Feb-2021 10:39	24-Feb-2021 10:39	24-Feb-2021 11:05	----
Compound	CAS Number	LOR	Unit		EM2102932-001	EM2102932-002	EM2102932-003	EM2102932-004	--------
					Result	Result	Result	Result	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser - Continued									
Nitrite + Nitrate as N	----	0.01	mg/L		**19.2**	<0.01	**48.8**	<0.01	**----**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**1.9**	**15.8**	**1.9**	**15.9**	**----**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**21.1**	**15.8**	**50.7**	**15.9**	**----**
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		<0.01	**2.81**	**0.08**	**2.95**	**----**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**16.4**	**230**	**21.9**	**231**	**----**
ø Total Cations	----	0.01	meq/L		**15.4**	**250**	**22.4**	**251**	**----**
ø Ionic Balance	----	0.01	%		**3.22**	**3.99**	**1.18**	**4.15**	**----**

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EM2115315**	Page	: 1 of 6
Client	: **VALENZA ENGINEERING**	Laboratory	: Environmental Division Melbourne
Contact	: KEITH LEWIS	Contact	: Customer Services EM
Address	: 101/620 COLLINS STREET MELBOURNE VIC, AUSTRALIA 3000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: Little River	Date Samples Received	: 05-Aug-2021 14:30
Order number	: -	Date Analysis Commenced	: 05-Aug-2021
C-O-C number	: 26043	Issue Date	: 13-Aug-2021 12:29
Sampler	: KEITH LEWIS		
Site	: 350 Little River		
Quote number	: ME/069/21_V2		
No. of samples received	: 4		
No. of samples analysed	: 4		

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Signatories

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Signatories	*Position*	*Accreditation Category*
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Jarwis Nheu	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EG020-T : EM2115315 #5 results for total metal have been confirmed by re-digestion and re-analysis.
- It is recognised that total metals is less than dissolved metals for sample #5. This has been confirmed by sample re-preparation and re-analysis..
- EG020-F : EM2115315 #5 results for dissolved metal have been confirmed by re-preparation and re-analysis.
- EA015H: EM2115315 #3: TDS by method EA-015 may bias high due to the presence of fine particulate matter, which may pass through the prescribed GF/C paper.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	BH01	----	----	----	----
				Sampling date / time	05-Aug-2021 11:27	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2115315-005	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**8.12**	----	----	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L		**5520**	----	----	----	----
EA045: Turbidity									
Turbidity	----	0.1	NTU		**76.6**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**164**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**164**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**100**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**3170**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**481**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**142**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**1160**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**32**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**1.06**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		**0.064**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.16**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.26**	----	----	----	----
EG020T: Total Metals by ICP-MS									
Copper	7440-50-8	0.001	mg/L		**0.005**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.344**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		**0.131**	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.012**	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.11**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.20**	----	----	----	----
EK040P: Fluoride by PC Titrator									

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	BH01	----	----	----	----
				Sampling date / time	05-Aug-2021 11:27	----	----	----	----
Compound	CAS Number	LOR	Unit		EM2115315-005	--------	--------	--------	--------
					Result	----	----	----	----
EK040P: Fluoride by PC Titrator - Continued									
Fluoride	16984-48-8	0.1	mg/L		**1.2**	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**1.35**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	14797-65-0	0.01	mg/L		**0.15**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	14797-55-8	0.01	mg/L		**0.01**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.16**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**3.2**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**3.4**	----	----	----	----
EK067FG: Filtered Total Phosphorus as P by Discrete Analyser									
Dissolved Total Phosphate	14625-44-2	0.10	mg/L		<0.10	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.04**	----	----	----	----
Total Phosphate	----	0.10	mg/L		**0.12**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**94.8**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**87.0**	----	----	----	----
ø Ionic Balance	----	0.01	%		**4.30**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)			Sample ID	DAM BOTTOM	SUMP	DAM TOP	----	----
			Sampling date / time	05-Aug-2021 09:04	05-Aug-2021 09:32	05-Aug-2021 10:16	----	----
Compound	CAS Number	LOR	Unit	EM2115315-001	EM2115315-002	EM2115315-003	--------	--------
				Result	Result	Result	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**8.88**	**7.89**	**9.35**	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Total Dissolved Solids @180°C	----	10	mg/L	**951**	**1620**	**12200**	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**10.5**	**251**	**540**	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	**28**	<1	**33**	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**175**	**230**	**111**	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**203**	**230**	**144**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**114**	**237**	**6500**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**377**	**621**	**1640**	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**18**	**48**	**486**	----	----
Magnesium	7439-95-4	1	mg/L	**35**	**52**	**597**	----	----
Sodium	7440-23-5	1	mg/L	**259**	**427**	**1730**	----	----
Potassium	7440-09-7	1	mg/L	**16**	**20**	**1810**	----	----
EG020T: Total Metals by ICP-MS								
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.006**	**0.002**	----	----
Manganese	7439-96-5	0.001	mg/L	**0.002**	**0.177**	**0.078**	----	----
Molybdenum	7439-98-7	0.001	mg/L	**0.045**	**0.100**	**0.004**	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	**0.006**	----	----
Boron	7440-42-8	0.05	mg/L	**0.07**	**0.13**	**0.79**	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	<0.05	----	----
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**1.9**	**2.2**	**8.7**	----	----
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.04**	**1.99**	**0.10**	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	**0.10**	**0.78**	<0.01	----	----
EK058G: Nitrate as N by Discrete Analyser								

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	DAM BOTTOM	SUMP	DAM TOP	----	----
				Sampling date / time	05-Aug-2021 09:04	05-Aug-2021 09:32	05-Aug-2021 10:16	----	----
Compound	CAS Number	LOR	Unit		EM2115315-001	EM2115315-002	EM2115315-003	--------	--------
					Result	Result	Result	----	----
EK058G: Nitrate as N by Discrete Analyser - Continued									
Nitrate as N	14797-55-8	0.01	mg/L		**13.5**	**36.2**	<0.01	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**13.6**	**37.0**	<0.01	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.8**	**2.2**	**26.6**	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L		**14.4**	**39.2**	**26.6**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.01**	**0.04**	**4.16**	----	----
Total Phosphate	----	0.10	mg/L		<0.10	**0.13**	**12.8**	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**17.1**	**27.0**	**184**	----	----
ø Total Cations	----	0.01	meq/L		**15.4**	**25.8**	**195**	----	----
ø Ionic Balance	----	0.01	%		**4.95**	**2.44**	**2.76**	----	----

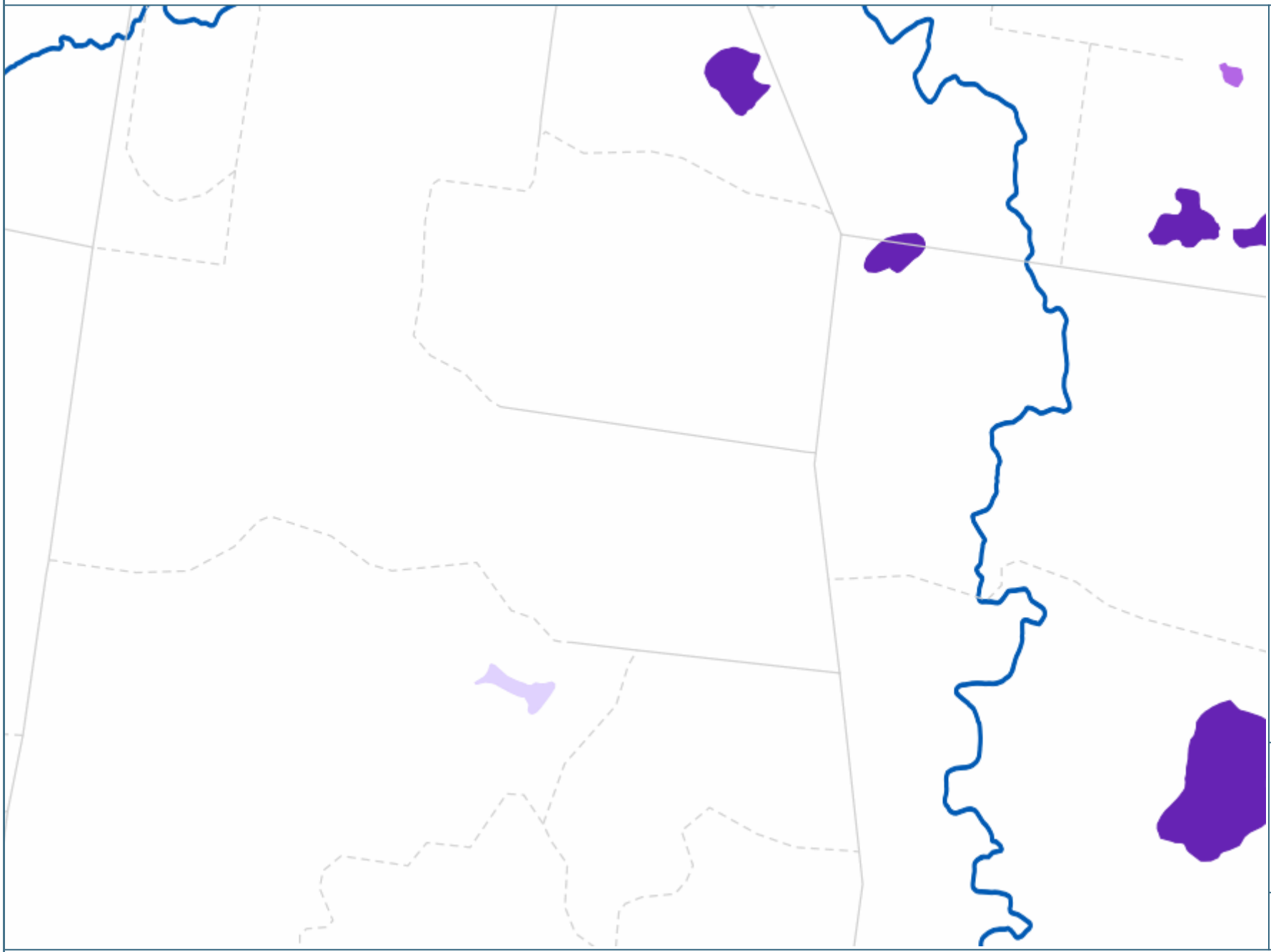
Appendix M

Groundwater Dependent Ecosystems

Australian Government
Bureau of Meteorology

Groundwater Dependent Ecosystems Atlas

Aquatic GDEs - WA453 region



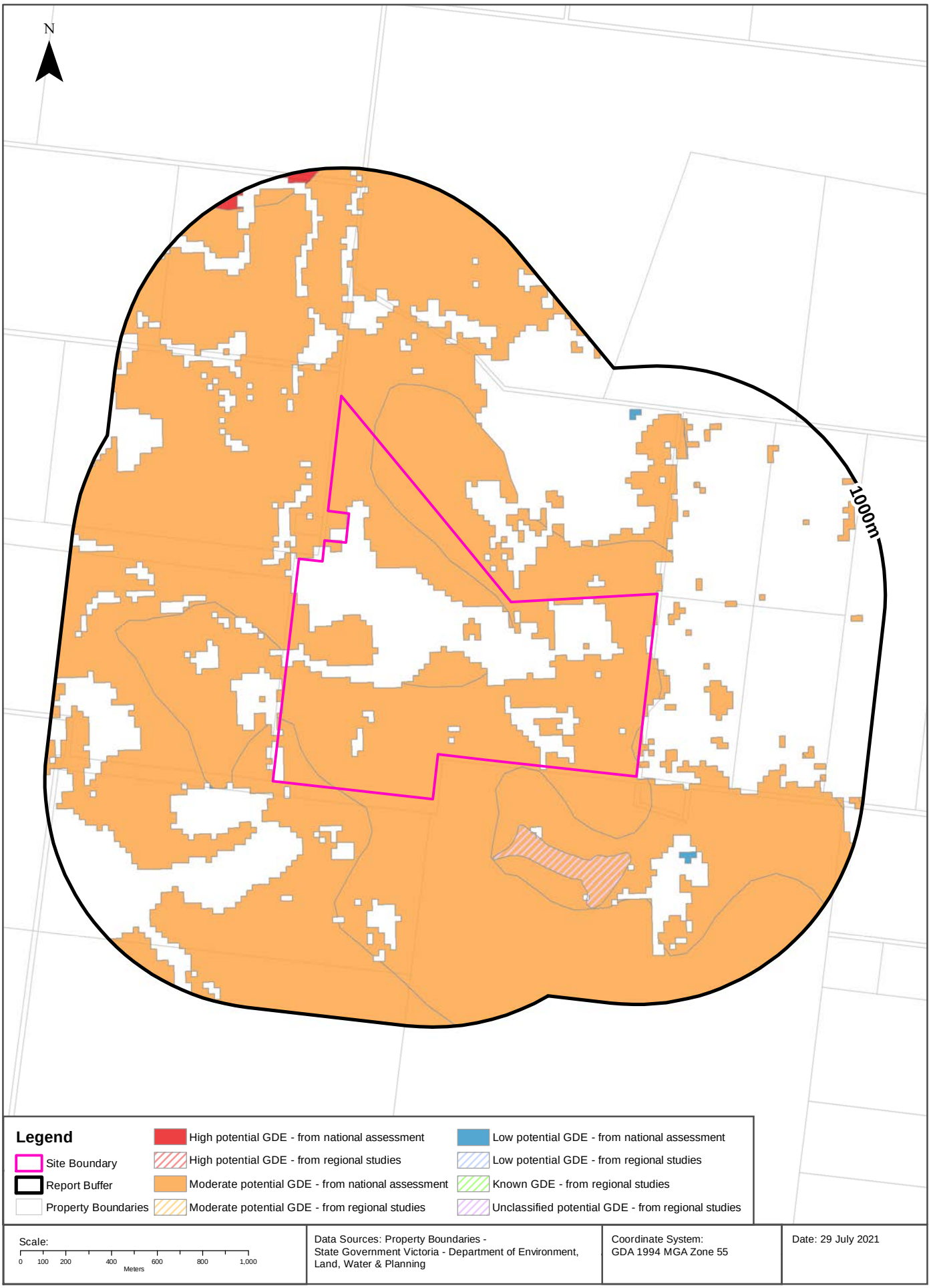
Data Source: Bureau of Meteorology, Geoscience Australia and State/Territory lead water agencies. Refer to metadata for further information: Click here

Australian Albers GDA94

Date: 3 April, 2023

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

250 Drysdale Road, Little River, VIC 3211



Ecological Constraints

250 Drysdale Road, Little River, VIC 3211

Groundwater Dependent Ecosystems Atlas

What GDEs exist within the dataset buffer?

GDE Type	Name	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial		Moderate potential GDE - from national assessment	Plains mainly on basalt lavas with many volcanic forms and lakes, partly on weak sedimentary rocks.	Vegetation	Fractured rock	0m
Terrestrial		Moderate potential GDE - from national assessment	Plains mainly on basalt lavas with many volcanic forms and lakes, partly on weak sedimentary rocks.	Vegetation	Unconsolidated sedimentary	0m
Terrestrial		Low potential GDE - from national assessment	Plains mainly on basalt lavas with many volcanic forms and lakes, partly on weak sedimentary rocks.	Vegetation	Fractured rock	153m
Aquatic		Unclassified potential GDE - from regional studies	Plains mainly on basalt lavas with many volcanic forms and lakes, partly on weak sedimentary rocks.	Wetland		265m
Terrestrial		High potential GDE - from national assessment	Plains mainly on basalt lavas with many volcanic forms and lakes, partly on weak sedimentary rocks.	Vegetation	Unconsolidated sedimentary	929m

Appendix N

HARC Surface Water Runoff Report

Memorandum

Project	Little River Surface Runoff	**Project No.**	BAR0003
Title	Model Report		
Date	23/05/2023		

HARC has been tasked by Barro Group to conduct a hydrological analysis of surface water flows that will be captured and retained onsite at an open-cut quarry near Little River. The small catchment of approximately 73.6 ha consists of both natural surfaces and the upper and lower levels of the quarry. Several rainfall-runoff models have been developed to estimate the volume of stormwater that will be captured by the site and this memo documents both the methodology used in constructing these models and the ensuing results obtained.

1.1 Contributing Areas

The quarry is located approximately 8km northwest of Little River and is surrounded by natural bushland on the northern fringe of the You Yangs Ranges. Based on the Stage 4 Site Development Plan provided by the Barro Group for the site, the quarry has been partitioned into several subareas as shown in Figure 1, with Table 1 detailing the associated areas.

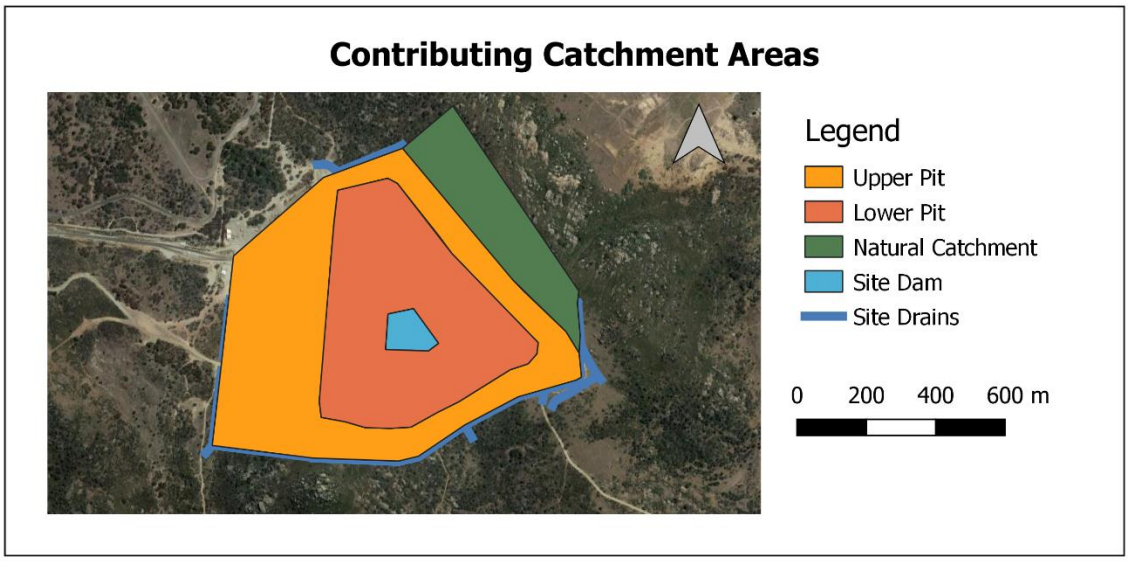


Figure 1: Contributing areas based on stage 4 stormwater management plan provided

Table 1: Areas by Region

Region	Area (ha)
Upper Pit	34.0
Lower Pit	27.6
Natural Catchment	12
Site Dam	1.3

1.2 Inputs and Model Development

To estimate the volume of surface water runoff at the site, several conceptual rainfall-runoff models were developed. These require rainfall and evaporation time series data as input and generate a time series of daily runoff volumes as output. Rainfall and evaporation data were sourced from BOM gauge 87048 which is located 2km North of the site at Mount Rothwell. The gauge data is of high quality with a high level of consistency from 1975 to present which is the period for which the models were run.

Typically, RR models are calibrated to a measured flow; however, no such flow meter data has been measured specifically for this site. Due to this, several approaches were taken to estimate the runoff and these were subsequently compared with one another to ensure relative consistency between approaches.

In order to estimate the runoff generated by the natural portion of the catchment, several different rainfall-runoff models including GR4J, AWBM and SURM were established with their default parameters. In particular, the Simple Urban Runoff Model (SURM) is the underlying model used in MUSIC software, for which many local jurisdictions provide guidance on default parameters that should be adopted for their region. As such, the SURM model used in this investigation has adopted the parameters specified in the Melbourne Water Music Guidelines.

Additionally, as an alternative means to verify the RR model results, there is a streamflow gauge (232200) located on Little River approximately 8km downstream from the site. While this gauge has a catchment area of about 413 km^2 and represents impacted flows, previous work has been completed by (SKM 2010) to determine the natural flows at the gauge. Using the natural flows, these have been scaled down proportionally by area to provide an estimate of runoff for the natural portion of the site.

The rainfall-runoff model results and transposed flow from gauge 232200 are shown in Figure 2 for the full duration of the time series assessed. Figure 3 presents the same data, but for the years between 1985 – 1991 to better depict the models' responses to the smaller rainfall events.

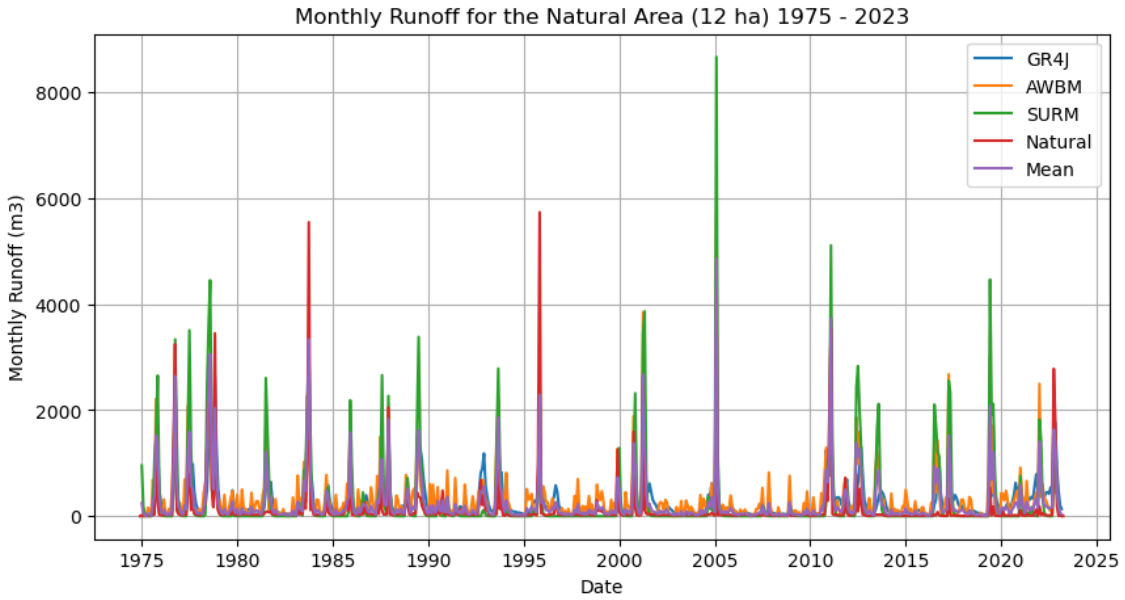


Figure 2: Monthly runoff generated by the natural portion of the site (1975 – 2023)

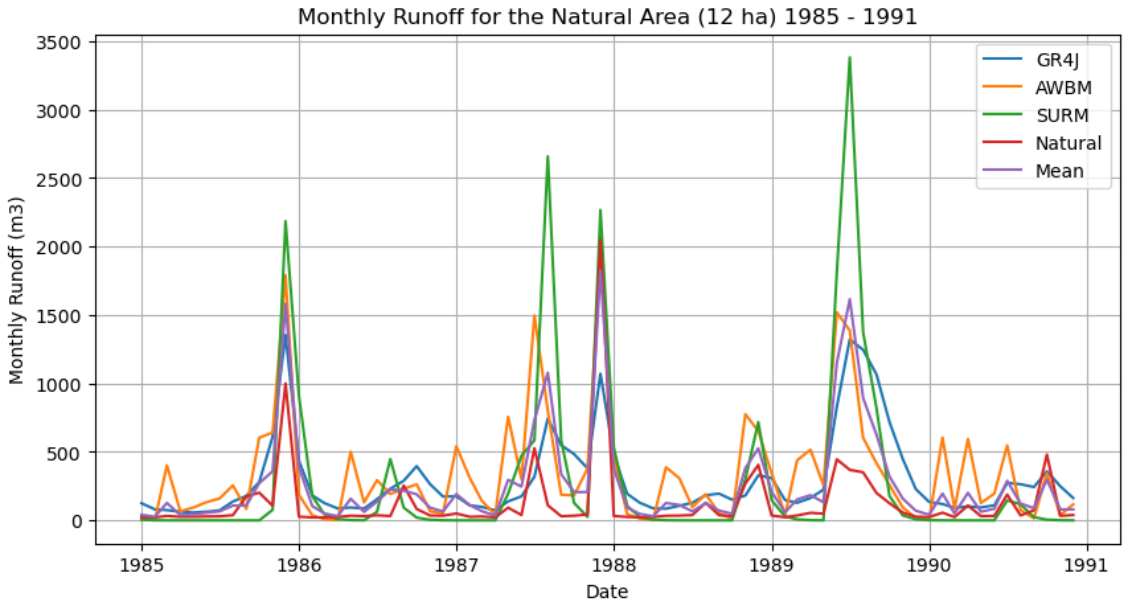


Figure 3: Monthly runoff generated by the natural portion of the site (1985 – 1991)

As can be seen in Figures 2 and 3, the models with default parameters and the proportioned natural stream flow are relatively consistent with all having similar monthly low flows. For the majority of high-flow events, the models produce quite similar results; however, there are several events with substantially different discharges as seen in early 2005. In the absence of more localised streamflow data, these models represent the best estimate of runoff for the natural portion of the catchment and the mean of all combined approaches has been taken forward in the investigation. Based on this, the runoff coefficient calculated across the entire time series is 0.05 which is in the range that would be expected for a natural catchment.

For the upper and lower levels of the pit which do not reflect the natural conditions of the catchment, separate SURM rainfall-runoff models have been used. For the lower level, two models have been adopted with site imperviousness factors of 0.1 and 0.5. This range has been adopted to reflect the uncertainty in the runoff behaviour of the lower pit, which is dependent on the amount of exposed hardrock that will not infiltrate surface water. Values within the range of 0.5 are in accordance with the Melbourne Water Music Guidelines for industrial sites and provide an upper limit for the expected heavily compacted, but unsealed surfaces of the site with some exposed rock. Similarly, a value of 0.1 reflects a more natural surface but would be a reasonable assumption of end-of-life restoration activities were undertaken. Figure 4 presents the results of the two models developed for the lower pit under the given assumptions.

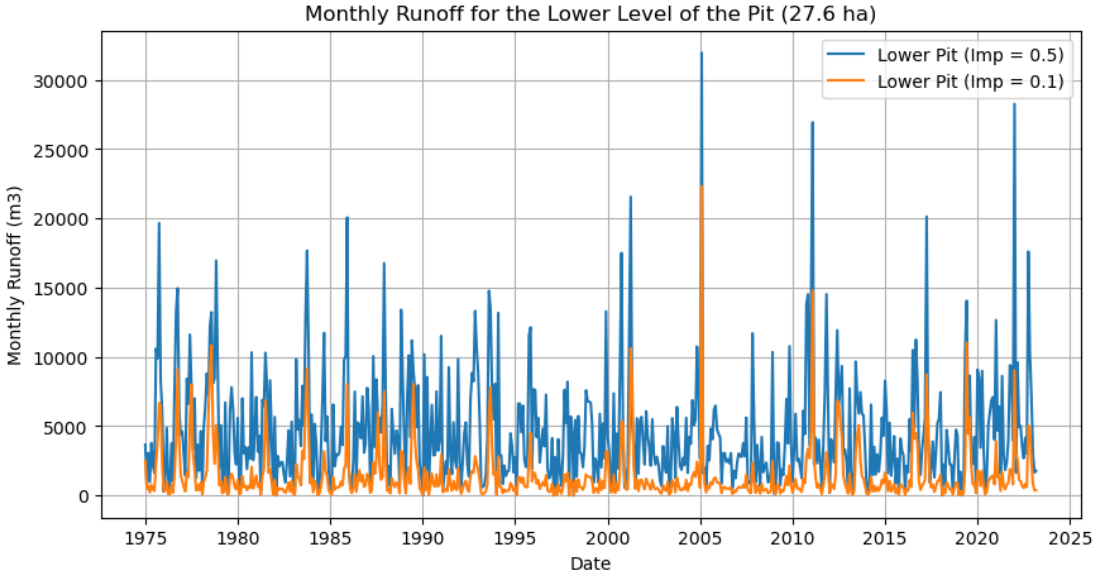


Figure 4: Monthly runoff generated by the lower level of the pit

For the upper level of the pit which will undergo natural restoration upon closure of the quarry, a site imperviousness of 0.1 has been adopted to reflect these efforts. The results of the rainfall-runoff model for the upper level of the pit are presented in Figure 5 below:

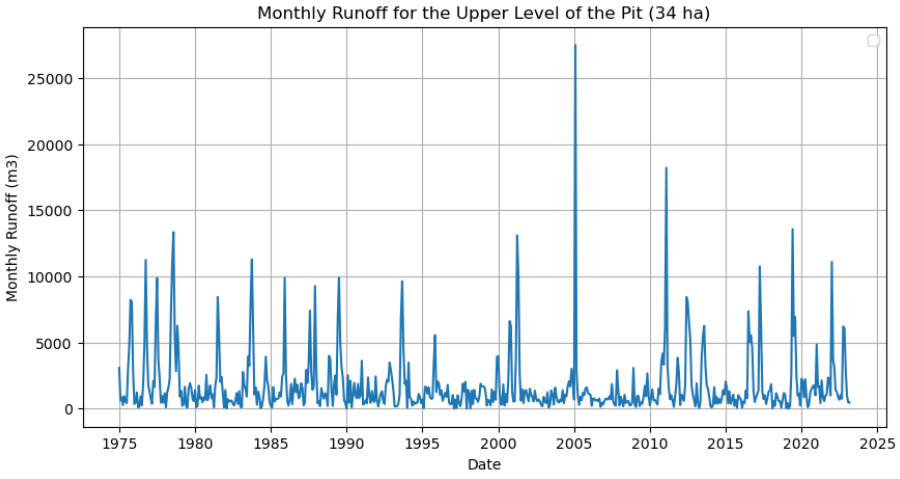


Figure 5: Monthly runoff generated by the upper level of the pit

1.3 Results

Based on the individual models developed for the natural surfaces and for the pit, two scenarios have been proposed to provide an upper and lower bound on the expected site runoff. The model assumptions are provided in Table 2 below:

Table 2: Adopted models for each scenario

	Models Adopted	
Catchment Component	**Scenario 1 (Lower Bound)**	**Scenario 2 (Upper Bound)**
Natural (12 ha)	Mean of all RR models developed for the natural catchment	Mean of all RR models developed for the natural catchment
Upper Pit (34 ha)	SURM model with site imperviousness = 0.1	SURM model with site imperviousness = 0.1
Lower Pit (27.6 ha)	SURM model with site imperviousness = 0.1	SURM model with site imperviousness = 0.5

The combined total runoff of the two scenarios at a monthly timestep over the period from 1975 to 2023 is shown in Figure 6.

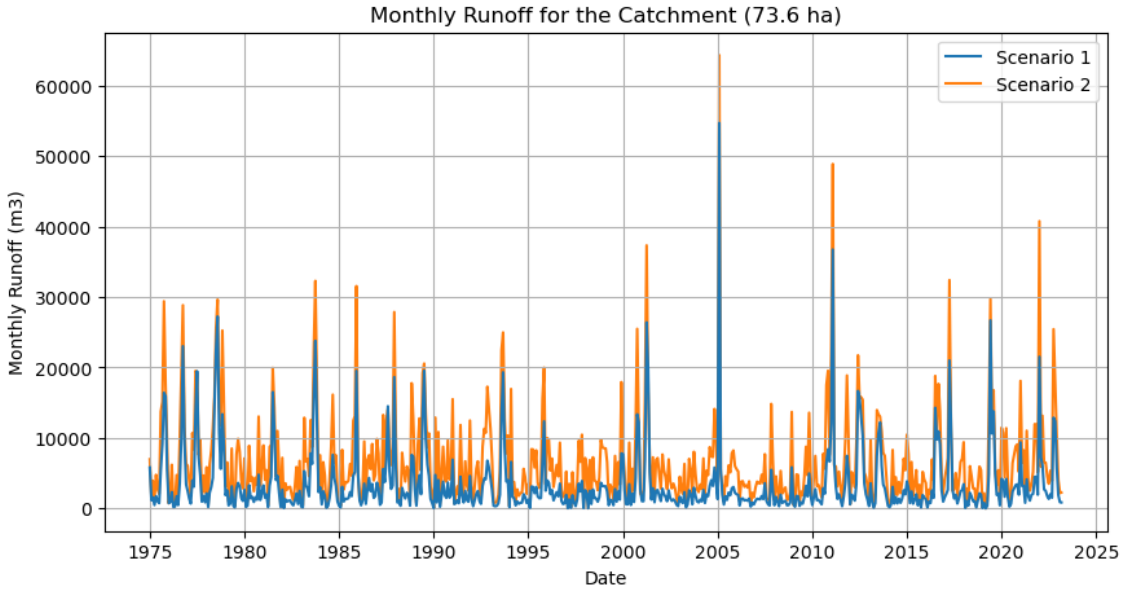


Figure 6: Monthly runoff generated by the site

Figure 7 presents the average monthly runoff volumes calculated across all the years that have been assessed and the relative contributions from each part of the catchment for both scenarios.

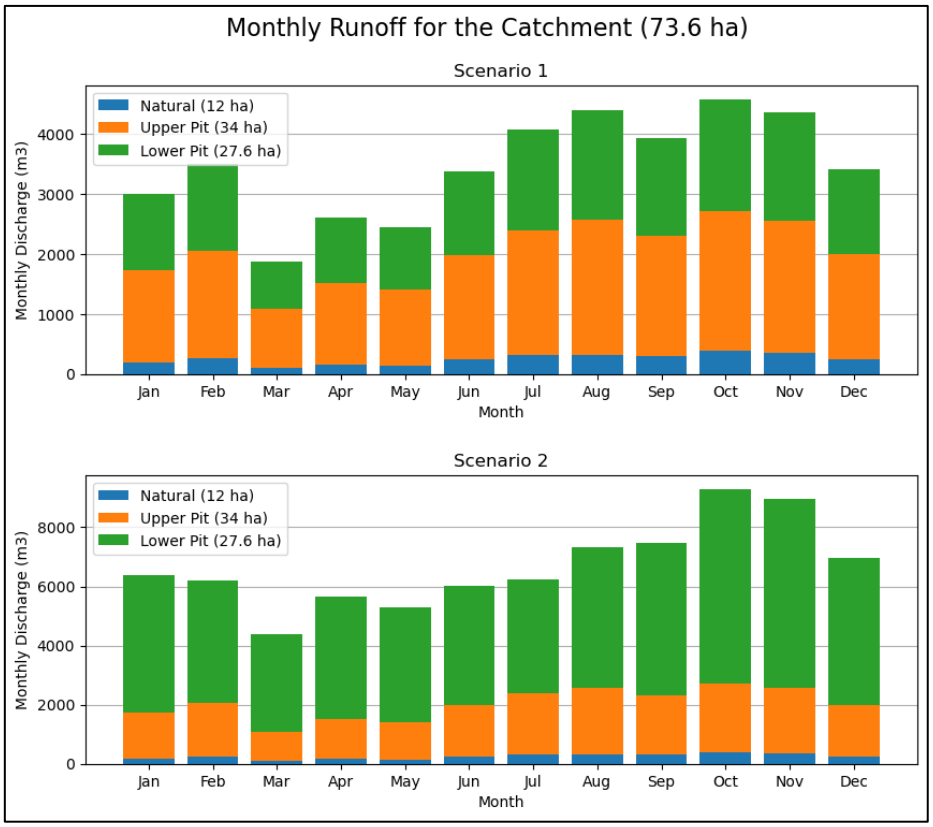


Figure 7: Average monthly runoff generated by site subarea

Tables 3 and 4 present a tabulated version of the average monthly runoff volumes for scenarios 1 and 2 respectively.

Table 3: Average monthly runoff generated by the site – Scenario 1

Month	Natural (ML)	Upper Pit (ML)	Lower Pit (ML)	Total (ML)
Jan	0.183	1.552	1.26	2.995
Feb	0.262	1.789	1.452	3.502
Mar	0.101	0.978	0.794	1.873
Apr	0.161	1.346	1.093	2.6
May	0.136	1.272	1.032	2.44
Jun	0.24	1.735	1.409	3.384
Jul	0.309	2.081	1.689	4.08
Aug	0.319	2.252	1.828	4.399
Sep	0.299	2.006	1.629	3.934
Oct	0.396	2.312	1.877	4.585
Nov	0.35	2.209	1.794	4.352
Dec	0.248	1.744	1.415	3.407
Yearly (ML)	3.004	21.276	17.272	41.551

Table 4: Average monthly runoff generated by the site – Scenario 2

Month	Natural (ML)	Upper Pit (ML)	Lower Pit (ML)	Total (ML)
Jan	0.183	1.552	4.642	6.377
Feb	0.262	1.789	4.153	6.203
Mar	0.101	0.978	3.313	4.392
Apr	0.161	1.346	4.153	5.660
May	0.136	1.272	3.898	5.305
Jun	0.240	1.735	4.047	6.023
Jul	0.309	2.081	3.860	6.251
Aug	0.319	2.252	4.766	7.337
Sep	0.299	2.006	5.170	7.475
Oct	0.396	2.312	6.596	9.304
Nov	0.350	2.209	6.395	8.954
Dec	0.248	1.744	4.958	6.950
Yearly (ML)	3.004	21.276	55.951	80.231

The intent of providing the two scenarios is to allow for a risk-based approach to the estimates of surface water runoff to the rehabilitated pit area.

1.4 Conclusion:

Several rainfall-runoff models have been developed and assessed to determine the volume of surface water runoff generated by an open-cut quarry located northwest of Little River. The site was split into both its natural area and the quarry surface and separate RR models were developed for each area to reflect the differences in perviousness. After trialling several models, two scenarios have been developed which provide the best estimate of the lower and upper bounds of runoff that could be expected. These estimates could be verified and further refined through the addition of site-specific data such as a record of water levels in the onsite dam or flow meter readings.

1.5 References:

SKM (2010) Little River REALM Model development report

Appendix O

Post closure water balance

Little River Post closure quarry pit water balance

Appendix O

										Equilibrium (m AHD)
Quarry Level	m AHD	165	150	135	120	105	90	75	60	
Area	m^2	356,852	319,054	283,158	249,062	214,826	182,528	154,489	12,943	
Area Dry	ha	0.0	3.8	7.4	10.8	14.2	17.4	20.2	34.4	
Area Dam 1/sump	ha	35.7	31.9	28.3	24.9	21.5	18.3	15.4	1.3	
Volume	m^3	5,280,471	4,716,533	4,181,420	3,673,325	3,163,725	2,684,696	2,267,283	60,257	
Inflows										
Cumulative volume	ML	26,028	20,747	16,031	11,849	8,176	5,012	2,328	60.3	
Groundwater Inflow	ML/yr	8.0	12.0	16.0	21.0	26.0	32.0	38.0	44.0	
Natural catchment runoff (12 ha)	ML/yr	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Upper pit runoff (0.5 imperviousness)	ML/yr	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	
Upper pit runoff (0.1 imperviousness)	ML/yr	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	
Lower pit runoff (0.5 imperviousness)	ML/yr	0.0	6.2	12.0	17.5	23.1	28.4	32.9	56.0	
Lower pit runoff (0.1 imperviousness)	ML/yr	0.0	1.9	3.7	5.4	7.1	8.8	10.2	17.3	
Outflow										
Lower pit net evaporation loss (4.55 ML/ha)	ML/yr	-162.4	-145.2	-128.8	-113.3	-97.7	-83.1	-70.3	-5.9	
Lower pit net evaporation loss (3.00 ML/ha)	ML/yr	-107.1	-95.7	-84.9	-74.7	-64.4	-54.8	-46.3	-3.9	
Lower pit net evaporation loss (6.00 ML/ha)	ML/yr	-214.1	-191.4	-169.9	-149.4	-128.9	-109.5	-92.7	-7.8	
Scenario 1A: Imp 0.5, Evap - 4.55 ML/ha										
Inflows less outflow	ML/yr				-2.9	23.3	49.2	72.5	165.9	
Years to fill to higher bench	Years					187	100	45	14	118.3
Scenario 1B: Imp 0.1, Evap - 4.55 ML/ha										
Inflows less outflow	ML/yr						-18.0	2.2	79.7	
Years to fill to higher bench	Years							85	29	76.6
Scenario 2A: Imp 0.5, Evap - 3.00 ML/ha										
Inflows less outflow	ML/yr		-5.7	14.9	35.7	56.6	77.5	96.5	168.0	
Years to fill to higher bench	Years			396	231	128	72	37	14	145.9
Scenario 2B: Imp 0.1, Evap - 3.00 ML/ha										
Inflows less outflow	ML/yr					-7.0	10.3	26.1	81.7	
Years to fill to higher bench	Years						263	115	28	98.9
Scenario 3A: Imp 0.5, Evap - 6.00 ML/ha										
Inflows less outflow	ML/yr					-7.9	22.7	50.1	164.1	
Years to fill to higher bench	Years						133	59	14	101.2
Scenario 3B: Imp 0.1, Evap - 6.00 ML/ha										
Inflows less outflow	ML/yr							-20.2	77.8	
Years to fill to higher bench	Years								30	71.9

Appendix P

Groundwater Management Plan

Nolan Consulting Pty Ltd

Little River Quarry (Work Authority No. 453) Work Plan Variation Groundwater Management Plan

Appendix P of Hydrogeological Assessment

Mountain View Quarries

(A division of the Barro Group Pty Ltd)

June 2023

A143-14

Table of Contents

Figures

1 Introduction

The Barro Group Pty Ltd (Barro Group) owns the land associated with Work Authority 453 (WA 453). This land is about 10 km north of Lara in the City of Greater Geelong. The locality plan is Figure 1. The Barro Group propose to extend and deepen the quarry (see Figure 2 for the proposed extraction boundary).

1.1 Background

Nolan Consulting has been engaged by the Barro Group to prepare this Groundwater Management Plan as Appendix P to the hydrogeological assessment report for the WA453 Work Plan variation.

1.2 Key elements

This Groundwater Management Plan:

- identifies monitoring sites
- lists monitoring parameters and frequency and duration of monitoring
- specifies monitoring methods
- identifies triggers
- lists contingency measures
- proposes review and reporting arrangements.

1.3 Definitions

For the purposes of this report the term "site" refers to the land within the boundary of Work Authority 453 (WA453) as shown in Figure 2.

2 Monitoring sites

The monitoring sites are:

- groundwater observation bores BH01 to BH04
- Dam 1/quarry pit sump pump
- rain gauge.

The locations of these sites are shown in Figure 3. Groundwater observation bore BH01 will be decommissioned at the end of Stage 1.

3 Monitoring parameters, frequency and duration

3.1 Monitoring parameters

3.1.1 Water level

All bores will be monitored (gauged) for level. The Dam 1/quarry pit sump will be monitored for level.

3.1.2 Volumes

The quarry's Dam 1/quarry pit sump pump line will be metered for cumulative flow.

3.1.3 Water quality

The water quality of all sites, except the rain gauge, will be tested in-situ and will be analysed by a NATA certified laboratory.

3.1.3.1 In-situ

Samples will be tested in-situ for:

- pH
- electrical conductivity
- dissolved oxygen
- redox
- temperature.

3.1.3.2 Laboratory

Samples will be analysed by a NATA certified laboratory for:

- pH
- electrical conductivity (EC)
- total dissolved solids (TDS)
- major cations and anions
- nitrite, nitrate and total kjeldahl nitrogen (TKN)
- total phosphorus
- iron
- manganese.

Dam 1/ quarry pit sump samples will also be analysed for turbidity (NTU) and dissolved oxygen.

3.1.4 Rainfall

Rainfall will be recorded at an on-site rain gauge.

3.2 Frequency and duration

The monitoring frequency is presented in Table 3-1.

Table 3-1: Monitoring program sampling frequency

Parameter	Sites	Frequency
Level	All sites	Monthly
Volume	Dam 1/ quarry pit sump pump	Monthly
Water quality - laboratory	All sites	Annual
Water quality – in-situ	All sites	Annual
Rain	Rain gauge	Daily

Monitoring will occur for the duration of the quarrying activity and will continue after completion of the final rehabilitation works until all rehabilitation objectives have been met and the Work Authority can be relinquished.

4 Methods

4.1 Water level

The water level at observation bores will be monitored with an electrical dip meter. The monitored depths will be subtracted from the top of casing levels which are surveyed to the Australian Height Datum (AHD). This level will be reported as m AHD.

The water level at the Dam 1/quarry pit sump will be determined from an installed gauge board surveyed to AHD. This level will be reported as m AHD.

4.2 Volumes

The volume of water pumped from Dam 1/ quarry pit sump pump line will be monitored by a cumulative flow meter and will be reported as kL.

4.3 Water quality

Groundwater sampling will be conducted in accordance with the EPA (2022) "*Groundwater Sampling Guidelines",* EPA Publication 699.1, February 2022.

Dam 1/ quarry pit sump sampling will be conducted in accordance with EPA (2009) "*Sampling and Analysis of Water, Wastewaters, Soils and Wastes"*, Publication IWRG701. A grab sampler will be used.

Samples will be collected, stored in containers provided by the testing laboratory and submitted for testing within the required holding times and under chain-of-custody (CoC) procedures.

For all collected samples the following will be undertaken:

- decontaminating sampling equipment with Decon 90 prior to site visit
- rinsing equipment with demineralised water between samples
- field filtering using SteriCups (0.22 µm) for dissolved metals
- storing samples immediately after collection in an ice filled esky
- transporting of samples to laboratory under CoC arrangements.

In-situ water quality parameters will be entered on field monitoring data sheets. NATA accredited laboratory certificate of analysis reports will be issued.

5 Triggers

5.1 Hydrogeological review

A hydrogeological review trigger will occur when extraction has progressed to the 60 m AHD quarry floor level.

As extraction progresses more information on quarry pit inflows and groundwater level responses will be obtained from this Groundwater Management Plan. Further drilling investigations may also be required.

This review will refine the estimates of the:

- cone of depression
- stabilisation water level of the final quarry pit
- time for stabilisation of the final quarry pit to occur

provided in the Nolan Consulting (2023) "*Little River Quarry (Work Authority No. 453) Work Plan Variation Hydrogeological Assessment*". At this review information from this Groundwater Management Plan will be assessed.

5.2 Water level and quality

The water level triggers are:

- the mean water level at any groundwater observation bore falls by more than 5 m in any one year
- the water level at Dam 1, prior to its move into the quarry pit in Stage 1, is 0.5 m from the overflow level (and a licence for off-site discharge is to be sought).

5.3 Water quality

The water quality triggers are:

- Dam 1/ quarry pit sump nitrate concentration exceeds 2.4 mg/L following sealing of fill with clay overburden at the former fertiliser site to the east of the current quarry
- exceedance of groundwater water quality objectives for applicable environmental values as per the ERS and a 20% change in mean concentration (over three events) from base concentrations for parameters monitored.

6 Contingency measures

The contingency measures to be implemented if trigger(s) are met are listed in Table 6-1.

Table 6-1: Contingency measures

	Trigger	Measure
1	The mean water level at any groundwater observation bore falls by more than 5 m in any one year.	Undertake hydrogeological review and assessment to ascertain the source of the fall and the magnitude of the risk of adverse impacts on environmental values. Further mitigation measures will be introduced if medium to high risks are identified.
2	The water level at Dam 1, prior to its move into the quarry pit in Stage 1, is 0.5 m from the overflow level (and a licence for off-site discharge is to be sought).	Do not discharge unless: • EPA approval is obtained • water quality in Dam1 complies with objectives for relevant environmental values as per the Environmental Protection Act (2017) Environment Reference Standard (ERS).
3	Dam 1/ quarry pit sump nitrate concentration exceeds 2.4 mg/L following sealing of fill with clay overburden at the former fertiliser site to the east of the current quarry.	Undertaken investigations to determine if nitrate concentrations are linked to explosives use and/or seepage from former fertiliser site. If so assess likely impacts in environmental values and take action to avoid adverse impacts.
4	Exceedance of groundwater water quality objectives for applicable environmental values as per the ERS and a 20% change in mean concentration (over three events) from base concentrations for parameters monitored.	Undertake hydrogeological review and assessment to ascertain the source and magnitude of the risk of adverse impacts on environmental values. Further mitigation measures will be introduced if medium to high risks are identified.

7 Review and reporting

7.1 Review

The Groundwater Management Plan will be updated:

- after a hydrogeological review is undertaken
- at any time, as agreed, should the understanding of the impacts change as a result of the monitoring outcomes.
- after contingencies measures are implemented as a result of reaching trigger(s)
- every 5 years in the absence of earlier updates.

7.2 Reporting

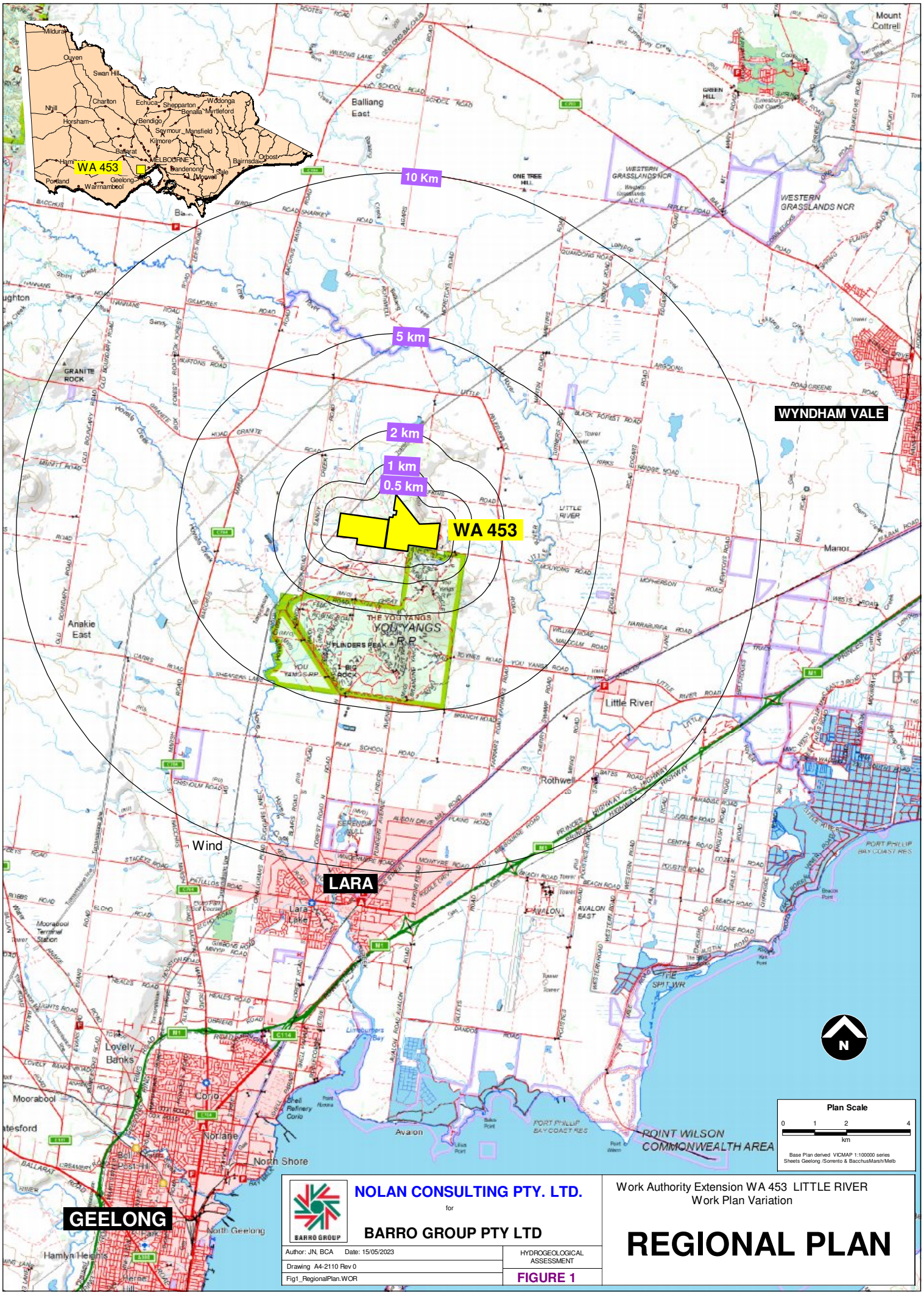
Annual groundwater monitoring reports will be prepared.

8 References

EPA (2022), "*Groundwater Sampling Guidelines*", EPA Publication 669.1, February 2022.

EPA (2009), "*Sampling and Analysis of Water, Wastewaters, Soils and Wastes*", EPA Publication IWRG701, June 2009.

Figures



NOLAN CONSULTING PTY. LTD.

for

BARRO GROUP PTY LTD

Author: JN, BCA Date: 15/05/2023

Drawing A4-2110 Rev 0

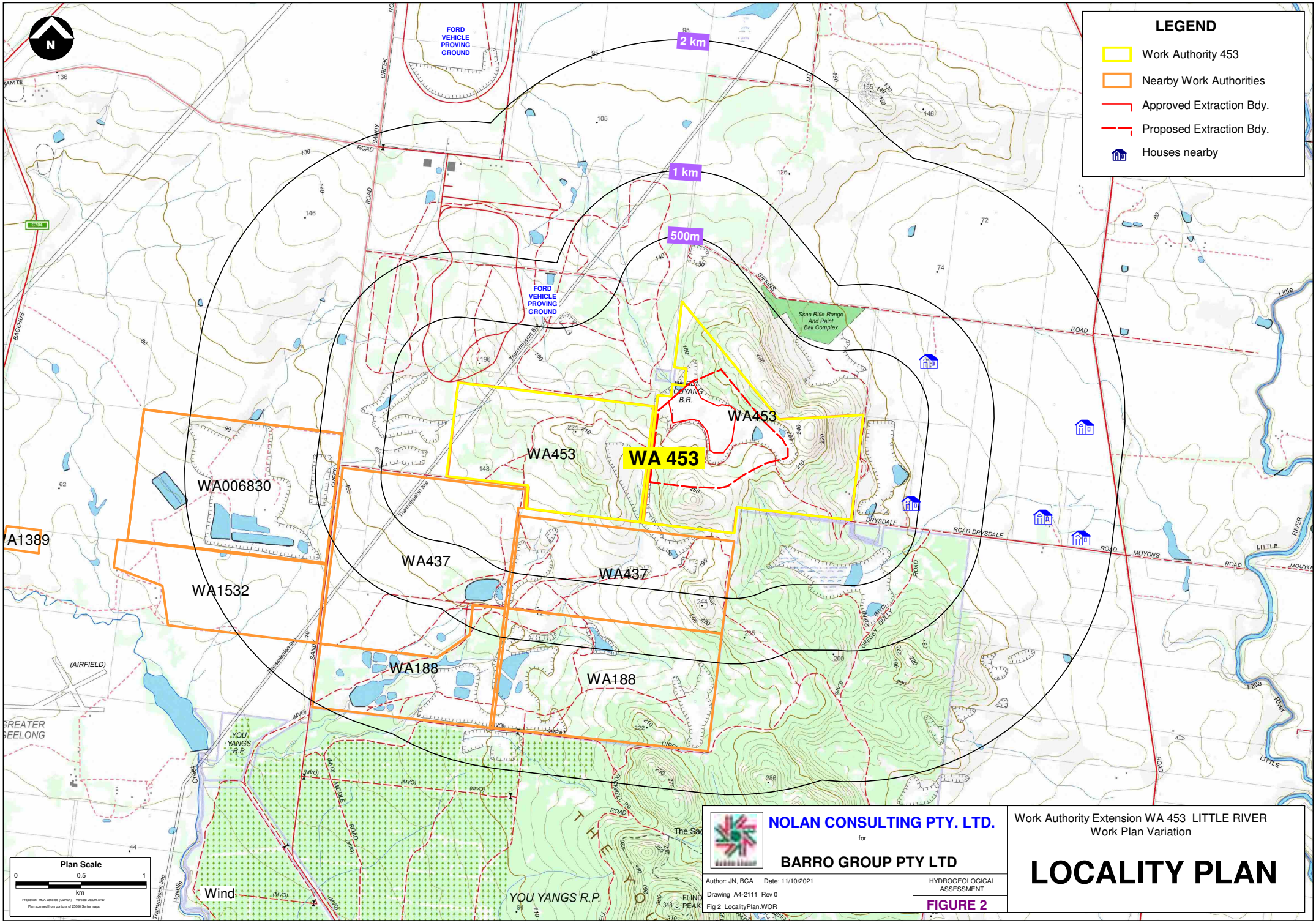
Fig1_RegionalPlan.WOR

HYDROGEOLOGICAL ASSESSMENT

FIGURE 1

Work Authority Extension WA 453 LITTLE RIVER
Work Plan Variation

REGIONAL PLAN


LEGEND
Work Authority 453
Nearby Work Authorities
Approved Extraction Bdy.
Proposed Extraction Bdy.
Houses nearby
2 km
1 km
500m
WA 453
WA453
WA006830
WA1389
WA1532
WA437
WA188
FORD VEHICLE PROVING GROUND
Ssaa Rifle Range And Paint Ball Complex
YOU YANGS R.P.
Plan Scale
0 0.5 1
km
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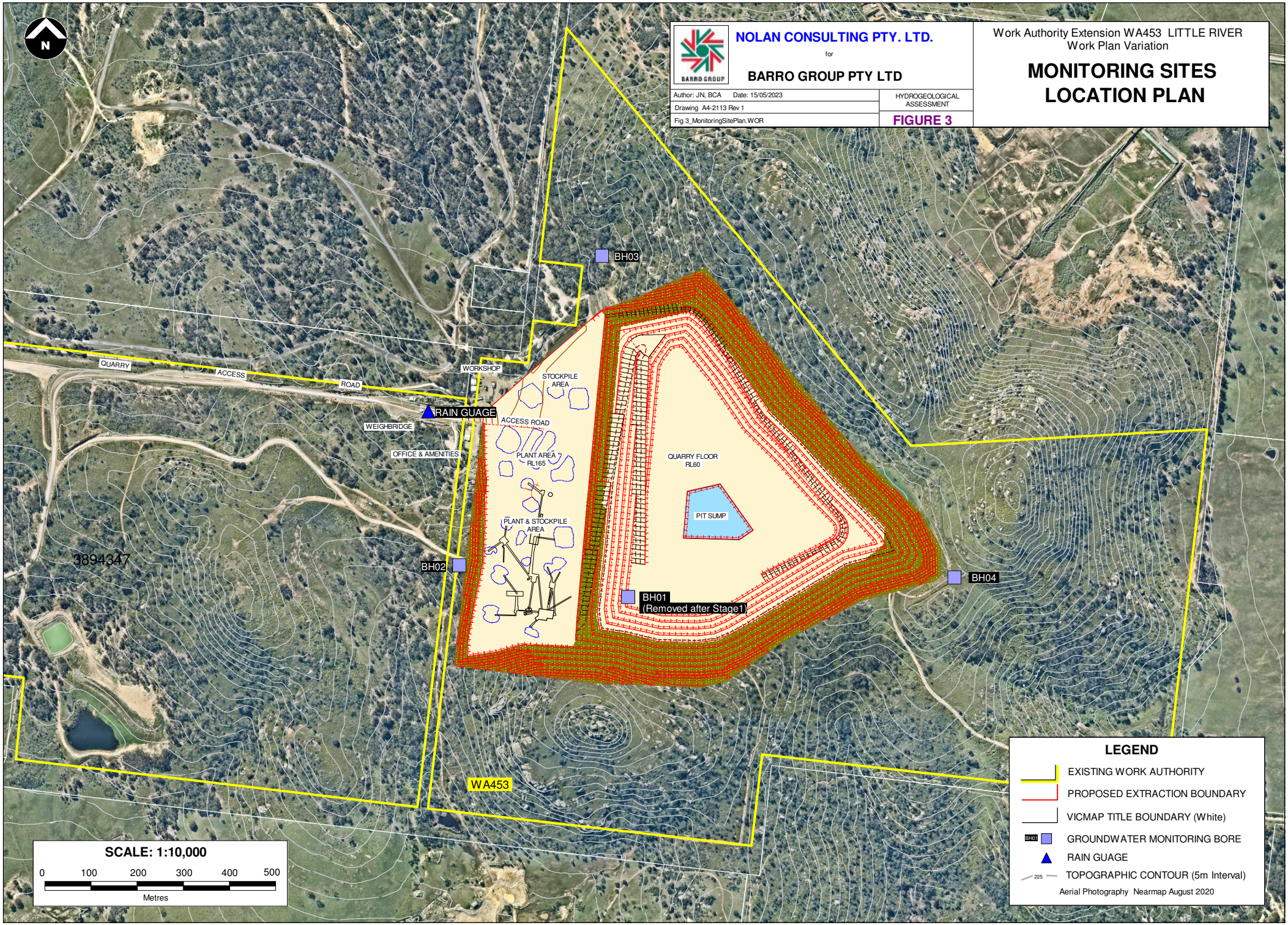
for
BARRO GROUP PTY LTD
Author: JN, BCA Date: 11/10/2021
Drawing A4-2111 Rev 0
Fig 2_LocalityPlan.WOR
HYDROGEOLOGICAL ASSESSMENT
FIGURE 2
Work Authority Extension WA 453 LITTLE RIVER
Work Plan Variation
LOCALITY PLAN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Drawing A4-2113 Rev 1
Fig 3_MonitoringSitePlan.WOR
HYDROGEOLOGICAL ASSESSMENT
FIGURE 3
Work Authority Extension WA453 LITTLE RIVER
Work Plan Variation
MONITORING SITES LOCATION PLAN
N
BH03
QUARRY ACCESS ROAD
WORKSHOP
STOCKPILE AREA
RAIN GUAGE
ACCESS ROAD
WEIGHBRIDGE
OFFICE & AMENITIES
PLANT AREA RL165
QUARRY FLOOR RL60
PIT SUMP
PLANT & STOCKPILE AREA
3894347
BH02
BH01 (Removed after Stage1)
BH04
WA453
SCALE: 1:10,000
0 100 200 300 400 500
Metres
LEGEND
EXISTING WORK AUTHORITY
PROPOSED EXTRACTION BOUNDARY
VICMAP TITLE BOUNDARY (White)
BH01 GROUNDWATER MONITORING BORE
RAIN GUAGE
225 TOPOGRAPHIC CONTOUR (5m Interval)
Aerial Photography Nearmap August 2020